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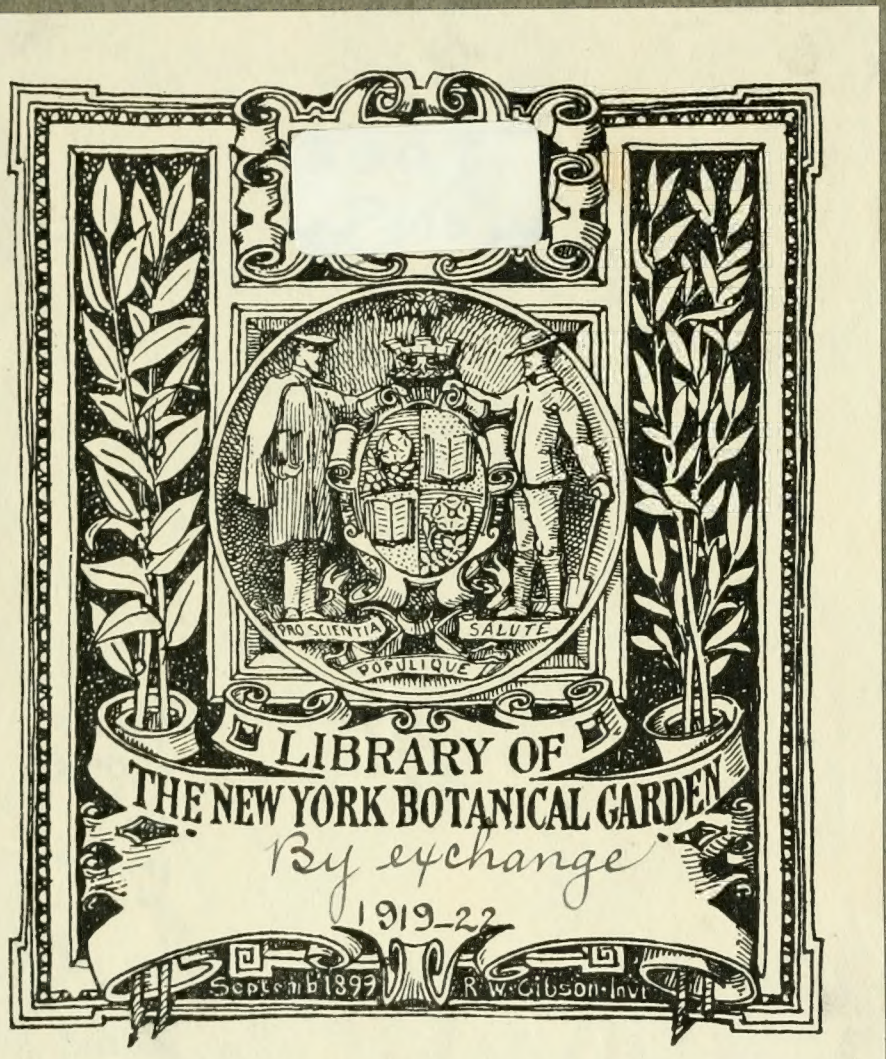
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ANNALS

OF THE

ROYAL BOTANIC GARDENS

PERADENIYA.

EDITED BY

T. PETCH, B.A., B.Sc.

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DEPARTMENT OF AGRICULTURE, CEYLON.

ANNALS

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ROYAL BOTANIC GARDENS, PERADENIYA.

EDITED BY

T. PETCH, B.A., B.Sc.

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Revisions of Ceylon Fungi.

(PART VI.)

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BOTANICAL
GARDENS

BY

T. PETCH, B.A., B.Sc.

THE present instalment of the Revisions of the Ceylon Fungi includes several emendations and corrections which have been made by other mycologists, more especially in the Dothideales, with further notes on these where necessary.

The duplicates of Thwaites's mycological specimens were mounted, probably in his time, on herbarium sheets, and constituted the sum total of the mycological herbarium at Peradeniya until 1905. The collection, however, was by no means complete, very many numbers being missing. In the course of overhauling an accumulation of unnamed specimens in the phanerogamic herbarium during recent years, a large number of Thwaites's specimens of fungi were found in packets, as originally placed by him, having apparently remained untouched ever since. It may be possible, from these, to supply further details concerning species the type material of which is scanty.

Further discoveries have shown that the statement made, or implied, in the first part of these Revisions, that named specimens were returned to Thwaites by Berkeley and Broome, is incorrect. Some years ago the heirs of the late W. Ferguson presented to the Royal Botanic Gardens a number of letters written by Thwaites to Ferguson, and in one of these Thwaites states, concerning his mycological collection: "The last lot goes to Berkeley by this mail, and I am putting away my own collections as fast as I can in good order for reference." Evidently Thwaites divided his specimens and kept part of each, and he followed the same course in the case of the lichens sent to Leighton, &c. The specimens at Peradeniya, therefore, are not strictly co-types, as they were not examined by the describers of the species. In actual fact they are in the

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majority of cases identical with the species under the same number at Kew; but where Berkeley and Broome divided a Thwaites's number into two or more species, these are, as a rule, mounted on the same sheet at Peradeniya.

A curious result follows, in the case of the Agaricaceæ. These were obviously described from the paintings sent, the originals of which are at Peradeniya and copies at Kew, spore details being added from the specimens. But it is quite clear, from peculiarities in form, &c., that in many cases the specimens from which the paintings were made were retained at Peradeniya. Which, then, are the type specimens?

There is yet a further ambiguity with regard to the type specimens of the Ceylon fungi. It is, I believe, generally understood that Broome furnished the microscopical details. In that case the specimens in the Broome herbarium in the British Museum would appear to have a better claim to be considered types than those in Berkeley's, at least as regards those species whose identification depends on such details. But this, again, depends on when the division of the specimens was made.

215.—Trogia infundibuliformis B. & Br.

Thwaites 685 was divided into two species, *Trogia infundibuliformis* B. & Br., and *Trogia bicolor* B. & Br. *Trogia infundibuliformis* was described as "Fuscus; pileo infundibuliformi subtiliter striato, margine acute crenato; stipite brevi, basi piloso, e strato orbiculari oriundo; venis decurrentibus, interstitiis lævibus (No. 685 in part). On dead wood and sticks. Pileus 1–1·5 inch across; edge jagged; stem 0·5–1 inch high, 1–1·5 line thick." *Trogia bicolor* was "Pileo ex infundibuliformi flabellato umbrino; stipite concolori e basi polita oriundo; hymenio pallido, venis decurrentibus (No. 685 in part). On dead wood. Pileus half an inch, or rather more, across, not striate; stem one-third of an inch high, three-quarters of a line thick, striate, springing from an orbicular polished disc, which is slightly fimbriated; veins decurrent here and there, distinctly bifid."

The type specimen of *Trogia infundibuliformis* in Herb. Kew is marked by Thwaites, "cut through vertically, and half retained by me." That would appear to indicate

Thwaites had only one specimen. But in Herb. Peradeniya there is, in addition to the other half of the Kew specimen, another complete example, as well as two specimens of *Trogia bicolor*, all on the same sheet. It would appear that Thwaites made two gatherings, the first consisting of one example only, which he divided, while the second furnished the specimens which were named *Trogia bicolor*. But he considered them the same species, and placed them on the same sheet in the Peradeniya herbarium.

Of the specimens in Herb. Peradeniya, the half and one other are dark brown, horny, and slightly translucent, with a texture resembling that of *Stereum elegans;* they are minutely striate. The other two specimens are smaller, less widely expanded, light brown, and not notably horny; the pileus is striate, when examined with a lens. It would seem probable that these are only younger specimens of *Trogia infundibuliformis.*

Trogia infundibuliformis, from fresh specimens, is entirely pale purple, or pale purple-brown, up to 4 cm. high. The pileus is deeply infundibuliform, about 3 cm. diameter, with the margin lobed and decurved, thin, rigid, and somewhat horny, minutely radially striate, with short broken striæ, becoming radially sulcate when dry. The gills are distant, sometimes forked, up to 1 mm. broad, decurrent, with an obtuse edge. The stalk is about 1·5 cm. high, and 2 mm. diameter in the middle; towards the base it expands, the base being 4 mm. in diameter, and surrounded by a white fibrillose ring, 1·5 mm. broad. The exterior of the stalk is pruinose, and its wall is horny, like the pileus; the interior is white, stuffed, becoming hollow. The wall of the stalk is a continuation of the pileus, and the hollow is filled with loose, white tissue, which ascends for a short distance over the base of the funnel; the upper surface of the pileus is not continued across the top of the stalk. There is consequently no true stalk.

216.—**Hydnum polymorphum** B. & Br.

Thwaites 178 was a Hydnum. Berkeley and Broome divided the specimen into two parts, one of which they named *Hydnum* (*Apus*) *polymorphum* B. & Br., and the other *Hydnum* (*Resupinati*) *versicolor* B. & Br. The specimen was

accompanied by a painting, which they assigned to the latter species. Recent specimens, however, show that the painting does not represent a resupinate species, but a full view of the under surface of a pileus.

Hydnum polymorphum was described as "Cuneiforme, e mycelio communi effuso oriundum, postice radiato-rugosum umbrinum, antice farinaceum luteum marginatum; aculeis acutis quandoque furcatis farinosis vel subgelatinosis. At first spongy, 1½–2 inches long, sometimes conchiform, sometimes forming mere thick protuberances covered on one side with prickles; hymenium yellowish, thin, rufous; mycelium resembling that of *Geaster mirabilis*."

Hydnum versicolor was "Recens nitide flavum, margine elevato albo, mycelio albo lacunoso affixum; aculeis alongatis subacutis siccis olivaceis. Five inches across; substance spongy, white."

The types of both species are in Herb. Kew. That of *H. versicolor* bears a note by Thwaites: "The whole plant when fresh of a beautiful bright yellow colour, except the growing edges, which are white." The specimens are sections of the pilei, exactly the same as the duplicates under *H. polymorphum*. The type of the latter bears a note by H. J. Banker: "These specimens are identical with *Hydnum versicolor*, and bear the same number." This determination is correct.

The fungus grows in large, imbricated plates, united behind into an irregular tuberculated mass, which may be 1 or 2 inches thick. The individual pilei are orbicular, up to 6 inches long and 8 inches broad. The upper surface is pale yellow or pale tan, minutely tomentose, the extreme upper layers being softly coriaceous, like kid leather. When old, it becomes grayish-brown. Internally the pileus is white and spongy, but strongly radially fibrillose when broken; the subhymenial layer turns purple-red when cut. The total thickness is up to 1¼ inches. The margin is obtuse and white. The hymenium is yellow to orange-yellow, becoming brown when old, with terete, blunt, close-set aculei up to 1·2 cm. long.

There is nothing on the fresh specimens, or on the Peradeniya herbarium specimen, to support the comparison with *Geaster mirabilis*.

217.—Polyporus russoceps B. & Br.

In Bull. Soc. Myc. France, XXX., p. 36, Patouillard has called attention to the fact that the pores of *Polyporus russoceps* bear cystidia, which are covered with short spines. He notes that solitary cystidia are rare, and irregularly distributed over the hymenium, but that the walls of the tubes bear minute tufts of cystidia, 30–60 μ in diameter. The upper surface of the pileus is covered by a loose villous layer, in which larger, more spiny cystidia occur, but there are none on the edges of the dissepiments.

In the type specimens the tubes are somewhat lax, and often radially elongated, and, in drying under pressure, they have separated from one another here and there. The specimens give the impression that the hymenium is soft when fresh. In a specimen recently collected the pore surface is rigid and the pores regular, while the edges of the pores are densely covered with cystidia, and the walls of the tubes bear the same cystidia for a short distance from the mouth.

218.—Poria interrupta B. & Br.

In Fungi of Ceylon, No. 508, Berkeley and Broome described *Polyporus interruptus* B. & Br., from Thwaites 652 in part; in No. 497, they enumerated *Polyporus vaporarius* Fr. (Thwaites 367, 369), and in No. 498, *Polyporus vulgaris* Fr. (Thwaites 367, 369 in part).

In "A Preliminary List of Ceylon Polypori," Ann. Perad., VI., pp. 87–144, the writer stated that *Polyporus interruptus* and the specimens assigned to *Polyporus vulgaris* were the same species, while the specimen assigned to *Polyporus vaporarius* were re-named *Poria aquosa*.

A further study of these species has convinced me that it is not possible to keep *Poria aquosa* distinct from *Polyporus interruptus*. The form named *P. interruptus* is that which grows on decaying branches at some height, 20 feet or more, above the ground. At that height it forms small cushions with a tomentose margin, and when these cushions coalesce, the continuous sheet is interrupted by bands or areas on which the pores are not yet developed. When this form is collected on fallen branches it is usually dry, and the dissepiments are

thin and rigid. It was the latter feature which influenced the separation of *Poria aquosa*, but further specimens have shown that the dissepiments of *Polyporus interruptus* are thick and soft when moist, like those of *Poria aquosa*.

The form named *Poria aquosa* grows on rotting trunks, usually on a vertical surface. The patches are white, extending over several feet, with a thin, tomentose margin. The pores are at first soft and watery, with thick dissepiments, but they become thin and rigid on drying. When dry the pores are angular, small, and up to 2 mm. long. Frequently the patches are interrupted by small horizontal pilei. The basal layer is a thin weft of hyphæ.

This species has recently been found to cause a root disease of tea, and consequently a larger series of specimens has come under examination. On the stems of the tea bush the fructification is similar to that observed on decaying tree trunks, but there is a greater tendency to produce pilei, sometimes in imbricated masses.

On exposed lateral roots pilei are produced along the whole length, at first discontinuous, but subsequently fusing into a continuous border up to a centimetre wide. The mycelium runs freely through the soil, and produces the Poria fructification in hollows, and the pilei in imbricated masses on sloping surfaces ; it also binds together dead leaves and twigs, developing pilei along the sides of the latter, and a very elegant Poria form on the under side of the leaves. This Poria form on the dead leaves may be 3 or 4 centimetres in diameter, a very thin layer of sub-hexagonal pores surrounded by a broad, radiating, byssoid margin. When a tea bush is attacked by this fungus, the surrounding area, for a radius of about 2 feet, may be covered in wet weather by the varied fructifications.

The pilei are small, orbicular, usually about 1 cm. × 5 mm., and 2 mm. thick. The upper surface is white when dry, but appears grayish behind when moist, and is minutely tomentose.

As this species produces pilei, it must be known as *Polyporus interruptus* B. & Br., not *Poria interrupta*.

In Fungi of Ceylon No. 507, Berkeley and Broome described a species as *Polyporus niphodes*, from Thwaites 652. They stated that it resembled Hymenogramme, and superficially

it certainly does, as the pore surface seems to consist of parallel lines with anastomoses here and there.

There are several pieces of the fungus in Herb. Kew and Herb. Peradeniya. In the type in Herb. Kew the specimen is on fragments of coconut stem; it forms a thick, chalky layer, a millimetre or a millimetre and a half in thickness, which has cracked into more or less rectangular fragments, and falls away from the substratum; the surface is closely covered with minute ridges, about 0·2 mm. apart, which anastomose freely. One piece in Herb. Peradeniya is exactly the same as that in Herb. Kew, but another is somewhat different, and serves to explain the whole. The latter piece is also on coconut wood, but the wood is covered with a sandy layer up to 2·5 millimetres thick; and the fungus forms over this a very delicate basal layer, which bears short, angular pores.

There is no doubt that this last piece is a Poria, and that it is part of the same fungus on the same substratum as the other pieces. It happened to grow on a horizontal surface, but the other pieces grew on vertical surfaces, and hence their pores in an old, weathered state appear as lines.

The explanation of the peculiar characters of the specimen—its chalky nature, separability from the substratum, fragility, &c.—appears to be that it grew on coconut timber which had been used in the construction of some building, and therefore was covered with lime and mortar. The main mass of the specimens is lime or mortar; the fungus is only a thin superficial layer. The fungus is clearly *Polyporus interruptus*, as it was evidently regarded by Thwaites, for he included it with the specimens 652, to which Berkeley and Broome gave that name.

In the Fungi of Ceylon, *Polyporus niphodes* is enumerated immediately before *Polyporus interruptus*. According to the rules of priority, therefore, the former name should be employed for this species. But seeing that the description of *Polyporus niphodes* is based on a specimen which consists of a mass of lime covered with weathered effete pores, and is practically unrecognizable, it would seem more sensible to retain the name *Polyporus interruptus*.

219.—Endogone fulva (B. & Br.) Pat.

In Fungi of Ceylon, Nos. 1181 and 1182, Berkeley and Broome described two new species of Paurocotylis as *P. fulva* and *P. fragilis* respectively. Their descriptions are as follows:—

"*Paurocotylis fulva* B. & Br. Depresso-subglobosa, extus lateritiofulva, intus flava ; sporis magnis obovatis (No. 963). On the ground, Peradeniya, Jan., 1869. About half an inch across, attacked by a short, rooting, spongy mass ; spores ·003 long.

"*Paurocotylis fragilis* B. & Br. Pallide griseo-flava, fragilis sima ; sporis globosis (No. 964). On the ground, Peradeniya. About a quarter of an inch across ; so fragile that it crumbles into atoms ; spores ·002 in diameter."

In Bull. Soc. Myc. France, XIX., p. 339, Patouillard recorded the results of his examination of *Paurocotylis pila* Berk. and *Paurocotylis fulva* B. & Br. He found that these two species were generically distinct. Of the latter, he stated : "Cette espece n'est en rien comparable à la précédente. Ses receptacles globuleux, fauves, de la grosseur d'un pois, tendre, dépourvus de cavité centrale, farcis de sporanges jaunes, ovoides ou presque ronds, ayant de 75 à 90 μ de diam., portés sur ses filaments larges et rameux et à contenu granuleux, la rattachent indiscutablement au genre Endogone."

The specimens of *Paurocotylis fulva* in Herb. Peradeniya (Thwaites 963) are sections of an example which was at least 15 mm. broad and 9 mm. high. A specimen recently collected is irregularly depressed-ellipsoidal, 4 cm. long, 3 cm. broad, and 2 cm. high. It was found on the surface of the ground by the side of a rotting log. When fresh it is white, with a few yellow-brown patches, becoming yellow-brown, and here and there red-brown, when dry. It has no sterile base, or internal cavities, the section showing a uniform, somewhat granular mass, pale brown in colour. The exterior is minutely tomentose, but there is no definite cortex, the outer layer being a browned zone of hyphæ and sporangia, rather more compact than the interior, to a depth of about 0·5 mm., soft and tender when fresh. The whole of the interior consists of a mass of hyphæ and sporangia or asci. The hyphæ are stout, 8–20 μ diameter, branching at a wide angle, hyaline becoming

yellow-brown, with granular contents, and filled with large brown granules when old, not septate, expanded at the axils. The sporangia, or asci, are oval, hyaline or pale yellowish, becoming pale yellow-brown, thick-walled, with granular contents, terminal, 90–120 × 64–80 μ. Thwaites's specimen agrees completely with this. It appears to be undoubtedly Endogone.

The specimen of *Endogone fragilis* in Herb. Peradeniya (Thwaites 964) is a fragment only. The denser outer layer, if ever present, has been broken off, and it is now a small crumbling mass, about 4 mm. in diameter. Its asci are chiefly subglobose, 50–64 × 48–55 μ, with some oval, 50–80 μ long, and its hyphæ are only up to 10 μ diameter. It is certainly Endogone, and probably only a young state of *Endogone fulva*

220.—Broomella niphidium (B. & Br.) Cooke.

This species, re-described in Ann. Perad., VI., p. 345, was transferred to Broomella by Cooke in Grevillea, XII., p. 105. This had been overlooked, probably because, by a printer's error, the name is there given as *Broomella nephidium*.

221.—Rhytisma maculosum B. & Br.

This was described by Berkeley and Broome from Thwaites 426, on leaves of *Sterculia* (*Pterygota*) *alata*, and Thwaites 497, on leaves of *Cansjera Rheedii*. Both collections are represented in Herb. Kew and Herb. Peradeniya. A few lines later they described *Rhytisma Pterygotæ*, on leaves of *Pterygota alata*, Peradeniya, April, 1866. Both these were transferred to *Marchalia* by Saccardo.

The Kew specimens of these two species have been examined by von Höhnel, who found that Thwaites 426 was identical with the specimen gathered in April, 1866 (Mitt. IX., pp. 48, 49; X., p. 37). He established on it a new genus, *Dothidasteroma*, with the single species *Dothidasteroma Pterygotæ*, subsequently changed, when the identity of the two species was discovered, to *Dothidasteroma maculosum*. Von Höhnel's genus is accepted by Theissen and Sydow in their revision of the Dothideales, Ann. Myc., XIII. (1915). The host plant is *Sterculia Thwaitesii* Mast.

The synonymy of the species is as follows :—

Dothidasteroma maculosum (B. & Br.) v. H., Fragm., X., No. 498 ; *Rhytisma maculosum* B. & Br., Jour. Linn. Soc., XIV., p. 130 ; *Rhytisma Pterygotæ* B. & Br., *ibid.*, p. 131 ; *Dothidasteroma Pterygotæ* (B. & Br.) v. H., Fragm., IX., No. 443 ; *Marchalia maculosa* (B. & Br.) Sacc., Syll. Fung., VIII., p. 737 ; *Marchalia Pterygotæ* (B. & Br.) Sacc., *ibid.*

The specimen on *Cansjera Rheedii* is not *Dothidasteroma*. According to von Höhnel, it bears a *Meliola*, closely allied to *Meliola amphitricha* (Fr.), and two species of *Asterina*, one with smooth spores and the other with spinulose spores. The latter has been described by him as *Asterina echinospora*, Fragm., X., No. 508.

222.—Rhytisma filicinum B. & Br.

Berkeley and Broome described this from a specimen on *Alsophila gigantea* (= *Alsophila glabra* Hk.), Thwaites 453, collected in May, 1856. It was included under *Marchalia* by Saccardo. After examination of the type in Herb. Kew, von Höhnel transferred it to *Hysterostomella*, as *H. filicina* (Fragm., No. 447). Theissen and Sydow (*loc. cit.*, p. 220) have instituted for it a new genus *Monorhizina*. It now stands as—

Monorhizina filicina (B. & Br.) Theiss. & Syd. ; *Rhytisma filicinum* B. & Br., Jour. Linn. Soc., XIV., p. 130 ; *Marchalia filicina* (B. & Br.) Sacc., Syll. Fung., VIII., p. 738 ; *Hysterostomella filicina* (B. & Br.) v. H., Fragm., IX., No. 447.

223.—Rhytisma Pongamiæ B. & Br.

Described by Berkeley and Broome from Thwaites 492, on *Pongamia glabra*, and included in Saccardo under *Cryptomyces*. It was re-described as *Phyllachora* in Ann. Perad., V., p. 291, and now stands as—

Phyllachora Pongamiæ (B. & Br.) Petch ; *Rhytisma Pongamiæ* B. & Br., Jour. Linn. Soc., XIV., p. 130 ; *Cryptomyces Pongamiæ* (B. & Br.) Sacc., Syll. Fung., VIII., p. 708.

224.—Rhytisma placenta B. & Br.

This was described by Berkeley and Broome from Thwaites 409, on leaves of *Symplocos spicata*, and Thwaites 420, on *Pavetta indica*. They stated that it was possible that the two

might be distinct species, the spores in the specimen on *Symplocos* being 30 μ long, and those of the specimen on *Pavetta* 15 μ long. In Saccardo it was listed under *Cocconia*, with a variety, *microspora*, on *Pavetta;* recent revisions have not altered that classification.

Von Höhnel, after examination of the type in Herb. Kew, stated that the spores were the same in both specimens (Fragm., No. 495), and that consequently the fungus occurs on plants which are not closely allied. Theissen and Sydow did not see the specimen on *Pavetta*. In Herb. Kew the specimen labelled " on *Pavetta indica* " is not on *Pavetta*, but on *Symplocos ;* thus, not only the fungi, as determined by von Höhnel, but also the leaves, are identical.

It may be noted that Thwaites 420 on *Pavetta indica* was included by Berkeley and Broome under *Asterina pelliculosa* (Fungi of Ceylon, No. 1140), and has been described by Theissen as *Lembosia Pavettæ* Theiss. (Ann. Myc., XI., p. 429). The spores of *Cocconia placenta* are 32–40 × 14–16 μ, and those of *Lembosia Pavettæ* are 18–21 × 6–8 μ. It would appear probable, therefore, that Berkeley and Broome's specimen of " *Cocconia placenta* " with spores half the normal size was *Lembosia Pavettæ*.

225.—Rhytisma spurcarium B. & Br.

Described from Thwaites 422, on leaves of *Artocarpus integrifolia*. On the same leaves also occurred *Rhytisma constellatum* B. & Br., which was described immediately after the former. Both were included in Saccardo under *Marchalia*, the second being the type species of the genus. Von Höhnel found that the two species were identical, and transferred it to *Hysterostomella*, as *Hysterostomella spurcaria* (B. & Br.) v. H., Fragm., IX., No. 448. Theissen and Sydow (*loc. cit.*, p. 251) amend the genus *Marchalia* and retain it for this species, but they adopt the name *Marchalia constellata*, as the latter name was placed first in the genus *Marchalia* in Saccardo. It would appear to be more correct to keep the name *Marchalia spurcaria* (B. & Br.) Sacc.

Marchalia spurcaria (B. & Br.) Sacc., Syll. Fung., VIII., p. 737 ; *Rhytisma spurcarium* B. & Br., Jour. Linn. Soc., XIV., p. 131 ; *Rhytisma constellatum* B. & Br., Jour. Linn. Soc.,

XIV., p. 131 ; *Marchalia constellata* (B. & Br.) Sacc., Syll. Fung., VIII., p. 737 ; *Hysterostomella spurcaria* (B. & Br.) v. H., Fragm., IX., No. 448.

226.—Lembosia tenella Lév.

According to Theissen (Ann. Myc., XI., p. 426), the Ceylon specimens on *Eugenia* in Herb. Kew under this name are *Asterina crustosa* Berk. & Cooke. Cooke recorded the latter species for Ceylon, on leaves of *Eugenia*, in Grevillea, XXI., p. 76.

227.—Micropeltis asterophora B. & Br.

The type of this species, which was described from Thwaites 427, on *Panicum*, has been examined by von Höhnel, who finds that it is a *Trichothyrium* (Fragm., IX., No. 424 ; XIV., p. 9). It now stands as *Trichothyrium asterophorum* (B. & Br.) v. H.

228.—Asterina pelliculosa Berk.

This was recorded for Ceylon by Berkeley and Broome, on *Pavetta indica*, *Jasminum Sambac*, *Acrotrema*, *Rottbœllia nigricans* (error for *nigrescens*), and *Mallea Rothii*, Thwaites's numbers 421, 490, and 498 being cited. According to von Höhnel (Fragm., X., No. 515) the type specimen is probably an unripe *Microthyrium* and the Ceylon specimens are different. The specimen on *Pavetta* is Thwaites 420, and, *fide* Theissen, is *Lembosia Pavettæ* Theiss. (Ann. Myc., XI., p. 429) ; this is the specimen referred to by Berkeley and Broome under *Cocconia placenta*. In Ann. Myc., X., pp. 186 and 200, Theissen states that Thwaites 421, on *Ficus*, in Herb. Kew under *Asterina pelliculosa*, is *Asterina crustosa* Berk. & Cooke ; and that the specimens on *Mallea Rothii* and *Melia parviflora*, also under *Asterina pelliculosa*, are *Asterina sphærotheca* K. & R. The latter is Thwaites 498 ; *Mallea Rothii* and *Melia parviflora* are synonyms of *Cipadessa fruticosa*.

Thwaites 490 on *Rottbœllia nigrescens*, in Herb. Peradeniya, belongs to the Dothideales. Its stromata are chiefly hypophyllous, irregularly elongated oval, up to 3 mm. long and 0·6 mm. broad. They are subcuticular, lying between the cuticle and the epidermal cells, multilocular, with globose or oval loculi, containing few asci. The upper black layer is

composed of polygonal cells, sometimes radially arranged towards the margin, and the margin is sometimes lobed. The asci are ovate, eight-spored, 38–40 × 21 μ. The spores are hyaline, oblongo-fusoid, one-septate, slightly constricted at the septum, ends rounded, minutely verrucose, 15–17 × 6–7 μ, the upper cell usually the broader. This species apparently belongs to the Munkielliæ, near *Isomunkia*, but it has no paraphyses.

The specimens on *Acrotrema* and *Jasminum Sambac* have not been found.

229.—Asterina nubecula B. & Br.

This name was published by Berkeley without description in Hooker's London Journal of Botany, VI. (1854), p. 211, but the species was not described until the publication of the Fungi of Ceylon. The type has been examined by Theissen, and re-described under the name of *Calothyrium nubecula* (B. & Br.) Theiss. (Ann. Myc., X., p. 192).

230.—Asterina Pleurostyliæ B. & Br.

The type of this species, Thw. 470, has been re-examined by von Höhnel, who finds that it is a *Meliola*, *Meliola Pleurostyliæ* (B. & Br.) v. H. (Fragm., X., No. 522). It was made the type of a new genus, *Asteridium*, by Saccardo in Syll. Fung., IX., p. 435.

In Herb. Kew there are two Ceylon specimens in the cover of *Asterina Pleurostyliæ*. One, on *Pleurostylia*, is the *Meliola ;* the other, on *Pavetta*, is *Lembosia Pavettæ* Theiss.

231.—Dothidea demersa Corda.

Under this name Berkeley and Broome placed Thwaites 464 on *Ixora parvifolia*, and Thwaites 520 on *Croton Thwaitesianum* Mull. = *Croton Klotzschianus* Thw. *Ixora parvifolia* should be *Ixora parviflora* Vahl. According to Theissen and Sydow, no type of *Dothidea demersa* Cda. exists. The specimen on *Ixora parviflora* has been named by them *Phyllachora Ixoræ* Theiss. & Syd., but they give the locality as East Indies, collected by Hobson, though they cite the number 464, which is Thwaites's (Ann. Myc., XIII., p. 553). The specimen on *Croton* in Herb. Kew is sterile, according to Theissen and

Sydow; though Berkeley and Broome's spore measurement, 10 μ, was evidently taken from it, as they state that the specimen on *Ixora parvifolia*, No. 464, differed in the shortly fusiform, granulated sporidia, 12·5–15 μ long. The corresponding specimen in Herb. Peradeniya is chiefly immature, but contains a few ripe asci, 75 × 10 μ, with elliptic, hyaline spores, 8–12 × 5–7 μ. The spores are rounded at the ends, not acute, as stated by Berkeley and Broome. This species on *Croton* appears to agree with *Phyllachora Tragiæ* (B. & C.) Sacc.

It is to be noted that the *Croton* species was also included by Berkeley and Broome under *Dothidea rhytismoides* Corda in Fungi of Ceylon, No. 1153. The Thwaites's numbers, host names, and herbarium specimens of the Ceylon Dothideales have been confused in a most bewildering fashion.

232.—**Dothidea rhytismoides** Corda.

Under this name Berkeley and Broome cited Thwaites 520, and 423 in part, stating that the host plant was *Hugonia Mystax* (Jour. Linn. Soc., XIV., p. 134). In the Supplement (*loc. cit.*, XV., p. 86) they again recorded *D. rhytismoides* Cda., citing Thwaites 1141. The latter specimen was subsequently transferred to *Phyllachora* by Cooke, in Grevillea, XIII., p. 63, as *Phyllachora infectoria*, on leaves of *Ficus infectoria*.

Thwaites 520 was on *Croton Klotzschianus* Thw. It had already been attributed to *Dothidea demersa* Cda. in Fungi of Ceylon, No. 1152 (see above). Thwaites 423 is on *Ficus parasitica*, and is *Dothidea microcenta* B. & Br. The specimen on *Hugonia Mystax* is Thwaites 521, a number which Berkeley and Broome did not cite. Probably 520 is an error for 521. This latter specimen has been named *Phyllachora Hugoniæ* by Theissen and Sydow (Ann. Myc., XIII., p. 512). Thwaites 1141, named *Phyllachora infectoria* by Cooke, has been transferred by Theissen and Sydow to their new genus *Catacauma*, as *Catacauma infectorium* (Cooke) Theiss. & Syd.; part of the leaf which constitutes Cooke's type specimen is included in Herb. Kew under *Phyllachora rhytismoides*.

Dothidea rhytismoides must consequently be deleted from the Ceylon list.

233.—Dothidea microcenta B. & Br.

For this species Berkeley and Broome cited Thwaites 423 in part, " on leaves apparently of Artocarpus." The co-type in Herb. Peradeniya is labelled " on *Ficus parasitica*" by Thwaites.

Cooke (Grevillea, XIII., p. 67) regarded this species as identical with *D. rhytismoides*, and, probably for that reason, *Dothidea microcenta* and *D. rhytismoides* in Herb. Kew are both in the cover of the latter. *Dothidea microcenta* was Thwaites 423, and *D. rhytismoides* 423, 521, and 499. The duplicates of 423 are labelled " on leaves of *Ficus* spp." 521 is labelled *Hugonia Mystax ;* it has been referred to above. 499, on leaves of *Urostigma tomentosum* (= *Ficus tomentosa*), was regarded by Berkeley and Broome as a variety of *Dothidea aspidea*, but while the mounted specimens are in the cover of *D. aspidea*, the packet of duplicates is included under *D. rhytismoides.*

Theissen and Sydow state (Ann. Myc., XIII., p. 384) that the type of *Dothidea microcenta* (Thwaites 423) contains two species, one hypophyllous and the other epiphyllous, on separate leaves and probably different gatherings. They take the hypophyllous species as the type, which they name *Catacauma microcentum* (B. & Br.) Theiss. & Syd., and state that the epiphyllous species is hardly different from *D. aspidea* Berk. But this epiphyllous form was referred to *D. aspidea* by Berkeley and Broome ; evidently this is another instance of their somewhat frequent omission to separate the specimens of their different species. In both species the host plant of Thwaites 423 is *Ficus parasitica.*

234.—Dothidea aspidea Berk.

This was originally described by Berkeley in Decades of Fungi, No. 497, as *Dothidea repens* (Corda) var. *aspidia*, " Pustulis latiusculis sparsis piceis ascis elongatis sursum attenuatis ; sporidiis hyalinis subellipticis. On leaves of *Ficus repens*, Ceylon." In Fungi of Ceylon, No. 1157, Berkeley and Broome described *Dothidea aspidea* B. & Br. " Elevata, nitida, late conica, apice plerumque plana, basi margine fusco-luteo cincta ; sporidiis ellipticis ; spermogoniis acicularibus (No. 423 in part, 499). On *Ficus repens*, &c.,

Peradeniya, Dec., 1867: sporidia 20 μ long, spermogonia 12·5 μ long." They also included Thwaites 499, on *Urostigma tomentosum*, as a variety or a closely allied species, but made no reference to any previous publication. The species, *ex* the Fungi of Ceylon, was included in Saccardo under *Phyllachora*.

In the cover of *Phyllachora aspidea* at Kew are three collections. The earliest is marked "*Sphæria aspidea* on *Ficus repens*, Ceylon, Oct. 12, 1850" (not 1860 as cited by Theissen and Sydow); this is the type. Another collection is Thwaites 423, marked "*Dothidea aspidea* Berk. *cincta* B. & Br. var., on *Ficus*, Peradeniya, Dec., 1867." The third is Thwaites 499, marked with the same name as 423, on *Urostigma tomentosum*, Feb., 1868.

What Berkeley or Thwaites meant by *Ficus repens* is not clear. Thwaites did not include *Ficus repens* in his Enumeratio Plantarum Zeylaniæ. The "*Ficus repens*" of the Botanic Gardens is *Ficus pumila* L., but the host plant in the type of *Dothidea aspidea* is certainly not that species. The leaf is identical with that of Thwaites 423, and appears to be *Ficus parasitica*.

Theissen and Sydow state that the epiphyllous species in Thwaites 423 is scarcely different from the type, which they name *Catacauma aspideum* (Berk.) Theiss. & Syd. It is on the same host plant as the type, and is the same species. Thwaites 499 is regarded by them as a variety of *Catacauma repens* (Corda).

235.—Dothidea exsculpta Berk.

This species was described by Berkeley in Decades 499a, Hooker's Journal of Botany, VI. (1854), p. 231, from Ceylon specimens on *Agyneia multilocularis* which were said to be sterile. It was again recorded by Berkeley and Broome from Thwaites 593 on *Aporosa Lindleyana*. In Saccardo it was listed as *Phyllachora*. Cooke re-described it as *Phyllachora exsculpta* Berk., in Grevillea, XIII., p. 64, without reference to the host plant.

Theissen and Sydow (Ann. Myc., XII., p. 193) state that in Herb. Kew there are Ceylon specimens on *Aporosa Lindleyana*, *Aporosa acuminata*, *Agyneia multilocularis*, and a Phyllanthoid plant. They have re-described it as *Parmulina exsculpta* (Berk.) Theiss. & Syd.

236.—Dothidea repens Berk.

The record of this species in the Fungi of Ceylon is "*Dothidea repens* B. in Hook. Jour., 1854, p. 231. On leaves of *Ficus religiosa*, Sept. 10, 1850." But on referring to the place cited it is found that the record there is *Dothidea repens* (Corda) var. *catervaria*, on leaves of *Ficus oppositifolia* (= *Ficus hispida* L. f.).

In Herb. Kew, *sub Phyllachora repens*, there is a specimen on *Ficus religiosa*, labelled by Berkeley "*Sphæria repens* Corda, G. H. K. T., Ceylon, Sept. 10, 1850." There is no specimen marked var. *catervaria*, but in the cover of *Phyllachora catervaria* there is one marked "*Sphæria catervaria* Berk., on *Ficus oppositifolia*, Ceylon, Oct. 12, 1850."

Theissen and Sydow refer the specimen on *Ficus religiosa* to *Catacauma repens* (Corda) Theiss. & Syd., and accept that on *Ficus hispida* as *Phyllachora catervaria* (Berk.) Sacc.

237.—Dothidea graminis Fr.

Berkeley and Broome recorded this from Thwaites 468, 489, 733, and 734 in part, on *Spodiopogon*, *Ichnanthus pallens*, and *Panicum fluitans*. 468 is *Spodiopogon obliquivalvis* (= *Ischæmum ciliare*). The specimens on *Panicum fluitans* in Herb. Peradeniya are marked 509 and 733. 489 is *Ichnanthus pallens*. The citation of 734 is probably an error.

Theissen and Sydow state that *Phyllachora graminis* (Pers.) Fuck., as represented in herbaria, is a collective species, and the different forms under this name require further investigation.

38.—Dothidea stenospora B. & Br.

This was described from Thwaites 465 on *Panicum trigonum*. It was said to have narrow, subfusiform acute spores, 15 μ long. It was transferred to *Phyllachora* in Saccardo, Syll. Fung., II., p. 602.

In the cover of *Phyllachora stenospora* in Herb. Kew are Thwaites 465 on *Panicum trigonum*, Thwaites 489 on *Ichnanthus pallens*, and Thwaites 468 on *Spodiopogon* (see above). The first of these is labelled *stenospora ;* the second is labelled *Sph. graminis*, but the drawing of it is marked *stenospora ;* the third is not named. The duplicates of 468 are in the cover of *Phyllachora graminis*.

Theissen and Sydow examined only a small part of the type specimen from Herb. Kew on *Panicum trigonum*, and found that it bore a conidial fungus with hyaline, acute spores, 15–18 × 2 μ. On the part of the type examined by me the same conidial form was present, together with asci. The stromata are oval, up to 0·6 × 0·4 mm. visible on both sides of the leaf. The loculi contain hyaline, continuous conidia, which are fusoid, straight, or curved towards the ends, sometimes strongly attenuated towards one end, 18–26 × 2–2·5 μ. The asci occur in the same loculi, and are 65–75 × 6 μ, eight-spored, spores uni- or bi-seriate. The spores are hyaline, continuous, with a central gutta, narrow-oval, ends acute, 13–14 × 3·5–4 μ. This is evidently a *Phyllachora*, and will stand as *Phyllachora stenospora* (B. & Br.) Sacc.

239.—Dothidea Osbeckiæ B. & Br.

This was enumerated in Saccardo, Syll. Fung., II., p. 633, as *Dothidella*. Theissen and Sydow (Ann. Myc., XII., p. 192) have re-described it as *Rehmiodothis Osbeckiæ* (B. & Br.) Theiss. & Syd.

240.—Dothidea Elettariæ B. & Br.

In Saccardo, Syll. Fung., II., p. 633, this was listed as *Dothidella*. Theissen and Sydow (Ann. Myc., XIII., p. 408) have re-described it as *Placostroma Elettariæ* (B. & Br.) Theiss. & Syd. It occurs on *Amomum floribundum* Tr. = *Elettaria floribunda* Thw.

241.—Dothidea incarcerata Berk.

This was described by Berkeley in Hooker's Journal of Botany, VI. (1854), p. 232. It occurred on leaves of *Uvaria*, *Guatteria*, and other Anonaceæ. Berkeley stated that specimens had been distributed under the name of *Sph. Guatteriæ*, in the belief that they were distinct from those on *Uvaria*, but further examination had forced him to unite them. Cooke, on finding the specimen marked *Sphæria Guatteriæ* in Berkeley's herbarium, published a description of it under the name of *Phyllachora Guatteriæ* Berk.

The specimens in Herb. Kew, in the cover of *Phyllachora incarcerata* (Berk.) Sacc., include one, October 12, 1850, labelled by Berkeley "*Dothidea incarcerata* Berk. (*Sphæria*

Guatteriæ Berk.)" ; another labelled "*Dothidea incarcerata*, Berk. *Sphæria* (*confertæ*) *Annonaceæ* Berk. *in Annonaceam*, Ceylon" ; and a third, labelled "*Dothidea incarcerata* Berk. Ceylon, 1850. G. H. K. T. *In Uvariam.*" The cover of *Phyllachora Guatteriæ* Cooke contains a specimen marked by Berkeley "*Sphæria Guatteriæ* Berk. Ceylon."

The species, *fide* Theissen and Sydow, stands as *Phyllachora incarcerata* (Berk.) Sacc.

242.—Dothidea Tetrantheræ B. & Br.

In Hooker's Journal of Botany, VI. (1854), p. 232, Berkeley, after describing *Dothidea repens* var. *aspidia*, stated that a form occurred in Ceylon on *Tetranthera tomentosa* which he would willingly unite with the former ; he had distributed it under the name of *Sphæria Tetrantheræ*.

In the Fungi of Ceylon, No. 1162, Berkeley and Broome described *Dothidea Tetrantheræ* B. & Br., on *Tetranthera Roxburghii* and *T. tomentosa*, citing Thwaites 442. This number was collected in December, 1867, and is on *T. Roxburghii ;* the specimen on *T. tomentosa* was collected October 12, 1850. In Herb. Peradeniya the co-type is marked 442 and 528, all the leaves being *T. Roxburghii*. *Tetranthera Roxburghii* Nees = *Litsea chinensis* Lam., and *T. tomentosa* Roxb. = *Litsea tomentosa* Heyne. The species was transferred to *Phyllachora* in Saccardo, Syll. Fung., II., p. 595, and Theissen and Sydow agree with that determination. It consequently stands as *Phyllachora Tetrantheræ* (B. & Br.) Sacc.

243.—Dothidea Thwaitesii Berk.

This was described by Berkeley in Decades of Fungi, No. 500, on leaves of a Cyperad. In the Fungi of Ceylon, No. 1163, the record was repeated, but the host plant was given as *Ficus oppositifolia*. The species on *Ficus oppositifolia*, described in Decades No. 497, was *Dothidea repens* var. *catervaria*, which was not included in the Fungi of Ceylon. It is evident that, by an error in compilation or printing, two lines have been omitted on page 135, Jour. Linn. Soc., XIV., viz., that giving the correct host of *Dothidea Thwaitesii*, and that containing the name *Dothidea catervaria*.

The species was included in Saccardo, Syll. Fung., II., p. 598, as *Phyllachora Thwaitesii* (Berk.) Sacc., a determination which Theissen and Sydow confirm.

244.—Dothidea perisporioides B. & C.

Thwaites 444, 456, and 494 were referred to this species by Berkeley and Broome, the host plant being given as *Desmodium triflorum*. They also recorded for Ceylon, *Dothidea grammodes* Kze., on *Crotalaria verrucosa* and on *Indigofera flaccida* (= *I. subulata* Poir.). But the three Thwaites's numbers, cited as *Dothidea perisporioides*, refer to the three different hosts, one of which is recorded under *D. perisporioides*, and the other two under *D. grammodes*. The fungi on the three plants in Herb. Peradeniya are all *Parodiella perisporioides* (B. & C.) Speg.

245.—Dothidea edax B. & Br.

This was included in Saccardo, Syll. Fung., II., p. 563, as *Ophiodothis*. It has been transferred by von Höhnel (Fragm., XII., p. 57) to *Ophiodothella*, as *Ophiodothella edax* (B. & Br.) v. H. It occurred on *Tephrosia suberosa* Benth.

246.—Dothidea phaselina Mont.

Berkeley and Broome recorded this species from Ceylon on bamboo. The original name was *Sphæria phaselina* Mont., Syll. Crypt., No. 855. It was included in Saccardo, Syll. Fung., I., p. 179, as *Eutypa phaselina* (Mont.) Sacc., and has been figured by Berlese in Icones Fungorum, III., tab. 59, fig. 2. The Ceylon specimen appears to be correctly identified. Berlese suggested that the type is on the petiole of a palm, but the Ceylon specimen is on bamboo.

247.—Dothidea Calophylli B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 1171, from Thwaites 590, as "Hysteriiformis, emergens, ostiolis latitantibus; ascis clavatis; paraphysibus linearibus; sporidiis sigmoideis angustis, uniseptatis. On leaves of *Calophyllum Walkeri*. Nuwara Eliya, 7,000 feet, April, 1868. Asci ·0035 long by ·0005; sporida ·0015–·002 long by ·00025." The measurements are, as usual, in inches.

Saccardo, Syll. Fung., II., p. 635, placed this species in *Scirrhia*, and was followed by Cooke in Grevillea, XIII., p. 72. Theissen and Sydow (Ann. Myc., XIII., p. 417) have examined the type specimen in Herb. Kew, and state that it cannot be determined with certainty as the specimens are scanty and effete. They describe the stromata as elongated, dull black, 1·5–2·5 mm. long, 0·5 mm. broad, pulvinately projecting, irregularly linear, running in the direction of the lateral nerves of the leaf, immersed in the mesophyll, constantly accompanied by an alga colony embedded beneath the cuticle, which at first covers the stroma, but afterwards splits. Asci were not seen. They state that the paraphyses (as described by Berkeley and Broome) and the position of the stroma in the mesophyll exclude the species from the genus *Scirrhia*, and suggest that it should be included in the lichens, though the loculi are dothideoid.

There is an abundance of specimens in the co-type in Herb. Peradeniya, and some contain mature asci. The stromata are chiefly hypophyllous, but may appear on the upper surface also, exactly over those on the lower. They are usually elongated, pulvinate, up to 2·5 mm. long, and 0·5 mm. broad, erumpent, rupturing the epidermis longitudinally with a single split (Berkeley and Broome's "Hysteriiformis"); but they may be irregularly oval, and in that case the epidermis may be broken in several places, in either straight or curved lines or pierced with minute circular holes. The stromata are formed in the mesophyll, and are composed of more or less parallel, dark brown hyphæ, except round the loculi, where the structure is parenchymatous, and the tissue lining the loculus is hyaline. When a stroma is present on both surfaces, the two are united internally by a loose web of brown hyphæ passing between the central mesophyll cells. The growth of the stroma ruptures the over-lying epidermis, the upturned edges of which border and partly cover the fungus. There is no epidermal clypeus. The loculi are usually distant, oval or circular in cross section and oval in longitudinal section, up to 170 μ deep, and 100 μ diameter; they are generally arranged in two rows, either closely approximated, or separating in the centre, according to the shape of the stroma; they have separate

ostiola, which are furnished with periphyses. The asci arise from the base of the loculus ; they are clavate, very shortly pedicellate, thick-walled, the apex up to 12 μ thick, eight-spored, with the spores four-seriate, 75–90 × 16 μ. The spores are hyaline, narrow-fusoid, slightly curved, one-septate, not constricted, 43–56 × 3–4 μ. From the holes in some of the leaves, it would appear that the stromata ultimately fall out.

I have not been able to find the paraphyses recorded by Berkeley and Broome. Nor is it possible to confirm Theissen and Sydow's statement that the stroma is covered by an alga layer, embedded beneath the cuticle. Some alga cells are present on the exposed part of the stroma, but they do not appear to extend beneath the cuticle, and they are not present on the young stroma, which, indeed, develops in the mesophyll below the epidermis. In the case of a coriaceous leaf like that of *Calophyllum Walkeri*, grown in a very moist climate, it is not exceptional to find algæ in cracks in the leaf or distributed over its surface. Indeed, it may be regarded as the rule rather than the exception. This species would appear to agree with *Dothidella*, and will stand as *Dothidella Calophylli* (B. & Br.).

248.—Dothidea dolichogena B. & Br.

This was included in Saccardo, Syll. Fung., II., p. 601, as *Phyllachora dolichogena* (B. & Br.) Sacc. Theissen and Sydow confirm this. The specimen was said to be on leaves of *Dolichos*, but it may be noted that Thwaites queried that identification of the host on the co-type in Herb. Peradeniya.

249.—Dothidea calamigena B. & Br.

Saccardo, Syll. Fung., II., p. 606, placed this species in *Phyllachora*. Theissen and Sydow have re-described it, from the type specimen, as *Phæochora calamigena* (B. & Br.) Theiss. & Syd. It occurred on *Calamus rudentum* Moon = *Calamus zeylanicus* Becc.

250.—Dothidea filicina Mont.

In Decades of Fungi, No. 499 (Hooker's Journal of Botany, VI. (1854), p. 232), Berkeley described a Ceylon specimen as *Dothidea filicina* Mont. MSS., var. *nerviseqüia*, on the under-side of fern leaves. In the Fungi of Ceylon, No. 1170, the record appears as " *Dothidea filicina* Mont. On leaves of ferns,

1851." In Saccardo, Syll. Fung., II., p. 632, it is listed as *Dothidella nervisequia* (Berk.) Sacc. Theissen and Sydow have transferred it to *Monorhiza*, as *Monorhiza nervisequia* (Berk.) Theiss. & Syd.

251.—Dothidea Barringtoniæ B. & Br.

The type specimen of this, on *Barringtonia speciosa*, was said to be immature by Berkeley and Broome. Cooke, in Grevillea, XIII., p. 41, stated that the specimen bore small ostiolata perithecia without fruit, which were probably those of a *Phoma*. Subsequently, in Grevillea, XVII., p. 79, Cooke and Massee described *Phoma Barringtoniæ* Cke. & Mass., on living leaves of *Barringtonia speciosa*, Kew, in a list of new British Fungi. Their description was " Epiphyllous, on large, irregular, glaucous spots. Perithecia convex, papillate, subgregarious, black, covered with the thin shining cuticle. Sporules fusoid-elliptic, with a nucleus at each end, continuous, hyaline, 13–15 × 4–5 μ."

Berkeley and Broome's description of *Dothidea Barringtoniæ* is " Cellulis radiantibus, in maculis latis orbicularibus dispositis, minutis, apice niveis. On leaves of *Barringtonia speciosa*. Botanic Garden, Peradeniya, Oct., 1864. Unfortunately there is no fruit : but the production is too remarkable to pass it by altogether. It has at first sight the appearance of an *Asteroma*." By " cellulis," Berkeley and Broome meant pycnidiis.

The type of *Phoma Barringtoniæ* Cke. & Mass. in Herb. Kew is identical with *Dothidea Barringtoniæ* B. & Br., and it would appear that it is part of the latter specimen, not a British fungus collected at Kew.

The fungus forms large spots up to 7 cm. diameter, usually semicircular, and extending from the margin of the leaf ; they are gray, obscurely zoned with pale brown, with an olive margin. The pycnidia are epiphyllous, scattered, subepidermal, prominent, forming minute black points, usually arranged more or less in concentric lines. Each point is tipped with white, owing to the rupture of the epidermis over the ostiolum. The pycnidia are globose, about 150 μ diameter, with a well-defined circular ostiolum, 10 μ diameter. The sporidia are narrow-oval, with obtuse ends, greenish hyaline, continuous, 12–16 × 5–7 μ.

The synonymy is—

Phoma Barringtoniæ (B. & Br.) Cke. & Mass.; *Dothidea Barringtoniæ* B. & Br.; *Phyllachora Barringtoniæ* (B. & Br.) Sacc.

252.—Meliola mollis B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1178, as having minute conidia 3·75 μ long, and one-septate ascospores, 20 × 10 μ. They gave figures of the spores. In Saccardo, Syll. Fung., I., p. 53, it was placed in *Dimerosporium*. The type specimen has been examined by von Höhnel, who finds (Fragm., X., No. 524) that it is a mixture, containing the following species :—

(1) A *Didymosporium* (?) with two-celled, violet, narrow-cylindric spores, 24 × 8–10 μ. These spores were taken to be the ascospores of the *Meliola* by Berkeley and Broome.

(2) A dothidaceous species (? *Rousseauella*) with cylindrical asci, containing elliptic spores, 20 × 10 μ. This is the ascus figured by Berkeley and Broome.

(3) A *Meliola*, with three-septate spores, 56–64 × 12–13 μ. Von Höhnel adopts the name *Meliola mollis* (B. & Br.) v. H. for the *Meliola*. It is on *Syzygium Jambolanum* DC. = *Eugenia Jambolana* Lam.

253.—Pisomyxa Amomi B. & Br.

This species has been re-described by von Höhnel (Fragm., VIII., No. 367), who has instituted for it a new genus, *Dimerosporiella*. This generic name, however, is ante-dated by *Dimerosporiella* Speg., Fungi Aliquot Paulistani, 1908, p. 11, *vide* Ann. Myc., VII., p. 557.

254.—Metasphæria plegmariæ (Ces.) Sacc.

This species was collected in Ceylon by Beccari and described by Cesati as *Sphærella plegmariæ*. In Saccardo, II., 183, it was transferred to Metasphæria.

Cesati's description is " Perithecia foliicola, sparsa, epi- et hypophylla, epidermide tecta, depresso-globosa, contextu vesiculoso. Sporidia fusoidea, curvula, obtusa, hyalina, triseptata, 10–11 × 2·5. Ad folia Lycopodii Plegmariæ." The

description has been copied into Saccardo as it stands, but Cesati's unit of spore measurement was 2 μ, and consequently the dimensions of the spores should be 20–22 × 5 μ.

This species has been re-discovered on leaves of *Lycopodium phlegmaria* at Hakgala. The perithecia are chiefly epiphyllous, immersed, black, depressed globose, 0·3 mm. diameter, with slightly projecting ostiola. By transmitted light the perithecial wall is rather pale brown, except at the ostiolum, which is black. The asci are narrow-clavate, almost sessile, without paraphyses, eight-spored, about 90 × 8 μ. The spores are narrow-oval or fusoid, straight, ends acute, hyaline, three-septate, not constricted at the septa, 16–24 × 4–6 μ.

255.—**Clypeolum zeylanicum** Cke. & Mass.

This species was described by Cooke and Massee in Grevillea, XVII., p. 43, from Ceylon specimens, as " Peritheciis sparsis, superficialibus, dimidiato-scutatis, atris, nitidis ($\frac{1}{4}$ mm. diam.), macula nulla vel macula brunnea indeterminata, insidentibus. Ascis clavatis. Sporidiis ellipticis, uniseptatis, hyalinis, 11 × 3 μ." In Grevillea, XVIII., p. 35, they stated that it occurred also on leaves from Brazil (Glaziou 18070, 18084, 18078).

The Ceylon specimen in Herb. Kew bears a label marked Ceylon in Berkeley's handwriting, and the locality " Padacumbra " in pencil. There is no date or name of the host plant.

The perithecia are situated on the upper side of the leaf in blackish patches up to 5 mm. diameter. These patches are superficial films, formed by rays, which start from a central point, branching and expanding as they run outwards, and ultimately coalescing into a more or less continuous patch. The arrangement resembles that of Cephaleuros. The rays are pale brown, blackening at the margins. The perithecia are embedded in the film ; they are black, up to 0·5 mm. diameter, smooth, peltate, broadly conical, superficial, with a thick, opaque, carbonaceous wall, in which the structure is not evident. The asci are narrow-clavate, 30 × 4 μ. The spores are hyaline, fusoid, one-septate, 12–14 × 3 μ.

The structure of the film does not agree with that of the Trichopeltaceæ. It would appear that *Clypeolum zeylanicum* should be classed as a lichen.

256.—Botryosphæria inflata Cke. & Mass.

Thwaites 542 was left undescribed by Berkeley and Broome, and was subsequently named *Botryosphæria inflata* by Cooke and Massee in Grevillea, XVII., p. 42. Their description is "Peritheciis cortice interiore nidulantibus, demum rimoso-erumpentibus, papillatis, glabris, atris, contextu coriaceo; rimis arcte conniventibus, graphideis, flexuosis; ascis clavatis, octosporis. Sporidiis biserialibus, ellipticis, utrinque obtusis, medio inflatis, continuis, hyalinis, 33–35 × 10 μ."

The specimens are somewhat peculiar, in that the pieces of bark are covered by a thin, compact, grayish-white film. This is a layer of fungus hyphæ, and, judging from some specimens of a scale insect embedded in it, may be an immature Septobasidium. It is not connected with the Botryosphæria, but may account for Cooke and Massee's "rimis graphideis." The stromata are immersed in the cortex, circular or oval in plan, up to 0·8 mm. diameter, only slightly erumpent, raising and cracking the outer cortical layers, usually in narrow, linear cracks. The stromata are black, with slightly projecting ostiola, parenchymatous. The perithecial cavities are scattered or crowded, up to 0·3 mm. diameter. The asci are clavate, thick-walled at first, with biseriate spores, the sporiferous part measuring about 30 × 16 μ. Numerous paraphyses are present. The spores are narrow-oval to lanceolate, ends obtuse, hyaline, 20–30 × 6–8 μ. They appear to be somewhat immature, and are not more inflated in the middle than spores of this type so often are.

In a recent collection, on *Cedrela toona*, the spores are 18–25 × 6–8 μ.

257.—Physalospora asbolæ Cooke.

Part of Thwaites 307 was marked *Sphæria asbolæ* by Berkeley, but he did not publish the name, probably because the specimen is in such bad condition that a definite determination is impossible. Cooke discovered it in Berkeley's herbarium, and published a description as *Physalospora asbolæ* B. & Br. in herb. (Grevillea, XX., p. 82). He gave the spore as 18–20 × 10 μ. I was unable to obtain anything determinable from

the perithecia ; they are effete, and in some cases are filled with brown hyphæ, suggestive of Diplodia.

Another part of Thwaites 307, in Herb. Kew, was also named by Berkeley, without publication. As, however, the specific name is indecipherable, Cooke did not " re-describe " it.

258.—Tryblidiella Leprieurii (Mont.) Sacc.

This was recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 1148, as *Angelina Leprieurii* Mont., from Thwaites 6, 362, and 1066. They gave the spores as 30–37·5 × 12·5 μ, and stated that they varied in size.

In " Mycetum in itinere Borneensi lectorum," Cesati described *Angelina Beccariana* Ces., collected in Ceylon by Beccari. The spores were said to be 12–15 × 5–6, but as Cesati's unit is 2 μ, this measurement is 24–30 × 10–12 μ.

Thwaites 362 in Herb. Peradeniya has spores 20–30 × 8–9 μ. Cesati's specimen of *Tryblidiella Beccariana* (Ces.) Sacc., in Herb. Kew, has spores 30–34 × 9–12 μ. Recent collections of Tryblidiella include gatherings with spores 32–34 × 9–11 μ, 24–30 × 8–10 μ, and 20–24 × 6–8 μ. These appear to be all the same species, and it is not possible to separate *T. Beccariana* on spore dimensions.

The asci of the small-spored form measured 160 × 9 μ ; in other forms they reach 260 × 12 μ. The disc is usually reddish-brown to olive, but in one gathering it was greenish-yellow.

259.—Aulographum intricatum B. & Br.

Thwaites 1226, on Pandanus, was described by Berkeley and Broome as " *Ailographum intricatum* B. & Br. Lirellis intricatis reticulatis, in maculis orbicularibus serius confluentibus dispositis." It has apparently escaped revision.

The leaf bears blackish cloudy patches, formed by somewhat distant, closely adherent, repent hyphæ. The perithecia are borne on these patches, and are rather crowded, superficial, linear, straight or slightly flexuose, sometimes forked towards one end, up to 1·5 mm. long, 0·2 mm. broad, subtriangular in section, with the apex subacute and the sides vertically ridged.

The specimen is almost entirely effete ; the few ripe spores observed are brown, broadly oval or subcymbiform, with rounded ends, one-septate, constricted at the septum, 30–32 × 12–14 μ.

This species is evidently *Lembosia*, and will stand as *Lembosia intricata* (B. & Br.).

260.—Lophodermium Fourcroyæ (B. & Br.) Massee.

This species was described by Berkeley and Broome as *Hysterium Fourcroyæ*, " Lirellis brevibus depressis rufis fissura angusta ; sporidiis fusiformibus multinucleatis (Nos. 361, 507 in part). On leaves of *Fourcroya*. Irregularly scattered, giving the leaves a dingy appearance ; sporidia ·0003 long. The same thing occurs on palm leaves, with the sporidia ·004 long."

In Saccardo, II., p. 769, it was listed as *Gloniella*. Massee re-described it as *Lophodermium*, in Grevillea, XXII., p. 34, and stated " an examination of the type specimen shows the spores to be linear, multiguttulate, and almost as long as the ascus, and are thus represented in two sketches made by Broome and attached to the specimens. The measurements given to these spore drawings are : Specimen on *Fourcroya*, 0·003 in. long, on palm 0·004 in. long. Unfortunately in the diagnosis of this species, in giving the measurements of the spores of the form growing on *Fourcroya*, the decimal point is put in the wrong place, thus ·0003 instead of 0·003."

The individual perithecia are black, oval, immersed, slightly elevated, covered by the epidermis, dehiscing longitudinally, about 0·5 mm. long and 0·3 mm. broad. They are crowded, and often confluent, usually in irregular lines, but sometimes stellately. The perithecial wall is parenchymatous, fused above with the epidermis. The paraphyses are linear, slightly thickened at the apex, and sometimes flexuose above. The asci are cylindric, attenuated below, with a short pedicel, 98–112 × 5–6 μ. The spores are linear, almost as long as the ascus, 1–1·5 μ diameter, contents granular, arranged in a parallel bundle. Massee's measurement of the spores is 60–65 × 1·5 μ.

The Thwaites's numbers cited in the "Fungi of Ceylon" are 361 and 507. The co-type in Herb. Peradeniya is 361 only, on *Fourcroya*. In Herb. Kew the numbers are 361 and 307, the former said to be on *Fourcroya* and the latter on palms. But the figure of 307 in Herb. Kew is labelled *Hyst. Fourcroyæ*, and that of 361 merely *Hysterium*. All the specimens appear to be on *Fourcroya*.

261.—Lophodermium maculare (Fr.) de Not.

Thwaites 434, on leaves of *Symplocos*, was attributed by Berkeley and Broome to *Hysterium maculare* Fr. = *Lophodermium maculare* (Fr.) de Not.

The leaves in the Ceylon specimen bear circular spots, up to one centimetre in diameter, gray, with a purple-brown margin. The perithecia are hypophyllous, scattered, black, oval, with somewhat pointed ends, immersed, very slightly elevated, about 1 mm. long, and 0·4 mm. broad, covered by the epidermis, dehiscing longitudinally. In section the cavity is somewhat rectangular. The wall of the perithecium is parenchymatous, about 40 μ thick at the base, confluent with the epidermis above. The numerous paraphyses are linear, with slightly thickened tips, and the asci are clavate, four-spored, 68–80 × 14–16 μ. The spores are hyaline, continuous, narrow-oval, thick-walled, 26–32 × 6–8 μ.

This species is evidently not *Lophodermium maculare*, but a *Hypodermella*. It may stand as *Hypodermella Symploci*.

Hypodermella Symploci n. sp.—Maculis rotundatis, ad 1 cm. diam., griseis, margine purpureo-brunneo. Peritheciis hypophyllis, sparsis, immersis, parum elevatis, nigris, ovalibus, utrinque acutiusculis, ad 1 mm. long., 0·4 mm, lat.; pariete parenchymato, basi 40 μ crass., supra epidermide confluenti. Paraphysibus numerosis, linearibus, apice subincrassatis. Ascis clavatis, quadri-sporis, 68–80 × 14–16 μ. Sporis hyalinis, continuis, angusto-ovalibus, pariete crasso, 26–32 × 6–8 μ.

262.—Gloniella Drynariæ (B. & Br.) Massee.

Berkeley and Broome described this species as *Hysterium Drynariæ*, "Lirellis immersis flexuosis, labiis candidis;

sporidiis triseptatis ellipticis, apicibus acutiusculis ; conidiis minimis (No. 611). On fronds of *Drynaria quercifolia*. Very lichenoid in appearance, covering the whole of the under-side of the frond. Accompanied by multitudes of pallid minute perithecia filled with oblong spores ·0002 long."

Massee, Grevillea, XXII., p. 16, re-described it under the name of *Gloniella Drynariæ* B. & Br. He stated that there was no evidence of any genetic affinity between the minute perithecia and the *Hysterium*, and described the latter as " Gregarious, covering the entire under-surface of the frond ; perithecia immersed, causing no discolouration, the slightly raised and ruptured cuticle resembling white lips," &c.

The fungus occurs on the scale leaves of the fern. These leaves are persistent, and remain attached to the rhizome, brown and dry, for a long time. In this condition they frequently become covered with lichens on the outer (under) surface, and this has occurred in the case of the specimens in Thwaites 611. The whole of the under-surface is covered with a thin lichen crust, greenish-gray, bearing minute cups ; this crust contains alga cells and numerous crystalloid bodies. The epidermis of the host plant is not visible, and the white lips are merely the edges of the lichen covering. No discolouration is evident in the lichen, but the whole of the leaf is brown throughout.

The fungus, however, does not appear to be part of the lichen. The perithecia are entirely embedded in the tissue of the host plant, and all the cells of the latter are permeated with hyaline mycelium. Their presence is indicated by the cracking of the epidermis, and consequently of the lichen, in straight, curved, or branched lines, 1–2 mm. long. In section the perithecia are broadly concave, up to 0·5 mm. diameter, or deeply concave, about three-quarters of a circle, 0·2–0·4 mm. diameter. The perithecial wall is red-brown, about 0·2 mm. thick. The asci are cylindric, eight-spored, the spores obliquely uniseriate or sometimes transverse, 72–96 × 10–12 μ. The paraphyses are linear, branched, and fusing above. The spores are oval, with rounded ends, three-septate, not, or slightly, constricted at the septa, 10–12 × 5–7 μ. Massee's spore measurement was 14–16 × 6 μ.

263.—Gloniella atramentaria (B. & Br.) Sacc.

This species was described by Berkeley and Broome as *Hysterium atramentarium*, "minutum, ellipticum, e crusta nigra oriundum; sporidiis clavatis trinucleatis (No. 300). On wood. Lirellæ scarcely visible to the naked eye; asci short, linear; sporidia hyaline, ·0003." In Saccardo, II., 767, it was included under *Gloniella*. Massee re-described it in Grevillea, XXII., p. 34.

The perithecia are oblong-oval, about 0·4 mm. long, 0·15 mm. broad, immersed, then erumpent, prominent, pulvinate, rounded or acutely ridged above, dehiscing longitudinally. Berkeley and Broome's "Crusta nigra" appears to be merely the blackened wood. The paraphyses are numerous, linear, longer than the asci. The asci are eight-spored, cylindric, 40–45 × 3–4 μ, with obliquely uniseriate spores. In the part of the type specimen examined by me only immature spores in the ascus were observed; these were narrow oval or fusoid, one-septate, 4–6 × 2 μ. Massee gave the spores as hyaline, three-septate at maturity, 7–8 × 4 μ.

264.—Gloniopsis orbicularis (B. & Br.) Massee.

This species was described by Berkeley and Broome as *Glonium orbiculare*, "Lirellis circinantibus in maculam orbicularem congestis; sporidiis oblongis quadriseptatis (No. 671). On Bamboo. Nearly ¼ inch across; lirellæ circinating round a central naked black spot, superficial, easily chipping off; sporidia ·0005 long, but scarcely mature." In Saccardo, II., 769, it was included under *Gloniella*. Massee (Grevillea, XXII., p. 33) re-described it as *Gloniopsis*.

The stromata are black, superficial, circular, about 6 mm. diameter, flat, thin, readily separable from the host. They bear concentric, or spirally arranged, ridges, in which the perithecia are situated, the centre of the stroma being usually even and barren. The stroma is about 0·3 mm. thick in the centre, brownish-white internally, with a thin, black, carbonaceous outer layer. The context is parenchymatous, the hyphæ being more or less parallel to the substratum in the barren parts, but erect and parallel in the ridges. There is no

true perithecium ; the cavities are small, circular in section, and about 70 μ diameter, splitting along the apex. Numerous paraphyses are present.

Berkeley and Broome gave the spore as 12·5 μ long, four-septate, but scarcely mature. The co-type in Herb. Peradeniya is in the same condition, and the spores observed in it are greenish-hyaline, narrow-oval to subfusoid, 12–14 × 3–4 μ, three-septate. Massee found, in the type in Herb. Kew, spores " three-, then five-septate and with a few vertical septa, 12–15 × 6–7 μ."

The tissue of the host plant appears quite sound, and does not contain any mycelium. Some of its cells are filled with starch.

265.—Micropeltis granulata B. & Br.

This was described in Fungi of Ceylon, No. 1139, as " Minuta granulata, ascis linearibus ; sporidiis lævibus late ellipticis. On leaves of *Caesalpinia sepiaria*. Matale, March, 1868. Rather spread out at the base, coarsely granulated, growing on the green parts of half-dead leaves ; sporidia ·0005 by ·0003."

The leaves bear minute scattered black patches, about 0·25 mm. diameter, which are circular, broadly conical, and coarsely granular with scattered warts. Sections show that the black area is a clypeus formed beneath the cuticle ; it is opaque and carbonaceous, except in the centre, where the cellular structure is evident ; it is about 34 μ thick at the edges, thinning to about 10 μ or less in the centre ; there is no true ostiolum.

The single loculus is formed beneath the clypeus, which in some cases extends beyond it, but in others does not wholly cover it. It is formed beneath the cuticular clypeus, and presses downwards the epidermal cells and the mesophyll. Its wall is hyaline and thin. There is no stroma in the usual sense, and no blackened zone, excepting the clypeus. The loculus is flattened, laterally oval, about 220 μ diameter, and 90 μ high in the middle. The asci are cylindric, or cylindrico-clavate, eight-spored, with obliquely uniseriate spores, 80–96 × 12–14 μ, furnished with linear paraphyses. The spores are oval, hyaline, continuous, minutely verrucose, 13–18 × 7–10 μ

This species is evidently not Micropeltis. It appears to be a reduced Trabutia, and may stand provisionally as *Trabutia granulata* (B. & Br.).

266.—Micropeltis gomphispora B. & Br.

This was described by Berkeley and Broome, in Fungi of Ceylon, No. 1137, as "Minutissima, hemisphærica, margine vix applanato; sporidiis biseriatis cuneiformibus; endochromate utrinque contracto. On leaves of *Pavetta indica*. Extremely minute; sporidia obtuse at either end, separated into two portions by a hyaline line, ·0003 to ·0006 long; perithecia minutely granulated, ·001 in diameter, or less." In Saccardo, II., p. 665, it was listed as *Microthyrium*.

The leaf in the type is Pavetta, but it appears to be *Pavetta angustifolia*, rather than *P. indica*. The perithecia are superficial, epiphyllous, scattered, about 0·1 mm. diameter, black, shining, minutely rugose, circular, flattened pulvinate. There is no free mycelium. The upper layer or cover is black-brown, composed of small irregular cells, not radially arranged, with a central circular ostiolum. The asci are ovate, 35–40 × 16 μ, eight-spored, spores biseriate, with short linear paraphyses. The spores are oblongo-fusoid, or ovate, with obtusely rounded ends, blackish-brown, with a pale septum about one-third the length of the spore from the upper, broader end, not constricted at the septum, 8–10 × 4–5 μ. The spore wall is hyaline over the septum; when viewed in profile, the dark wall of the spore is interrupted by a short hyaline length over the septum.

This species belongs to the *Hemisphæriaceæ*, Section *Dictyopeltineæ*. It differs from all the recorded genera in its dark spores, and would appear to require the institution of a new genus, which may be known as *Phæopeltis*.

Phæopeltis, gen. nov., *Dictyopeltineæ*.—Cover netted, not radial; ostiolate; spores black-brown, one-septate; paraphyses present.

Berkeley and Broome's species will then stand as *Phæopeltis gomphispora* (B. & Br.).

267.—Micropeltis applanata Mont.

This was recorded from Ceylon in Fungi of Ceylon, No. 1138, on leaves of *Agyneia multilocularis*. Berkeley and Broome added the note " Sporidia fusiform, multiseptate, ·0002 long ; in *M. marginata* ·0003 long." It is not clear whether they meant that the first of these measurements had been obtained from the Ceylon specimen, or whether they were merely giving general information.

The fructifications, in Fungi of Ceylon, No. 1138, are black, epiphyllous, superficial, scattered, circular, about 0·5 mm. diameter, scutate, minutely granular. The upper layer is netted in structure and blue-green, with a narrow hyaline margin. There is no free mycelium. The ostiolum is central and circular. Beneath the upper layer there is a dense layer of crystalloid bodies. The asci are obclavate, thick-walled, about 48 × 14 μ, without paraphyses. Most of them are not quite mature, but a few show fusoid-cylindric spores, with rounded ends, hyaline, rather thick-walled, two-septate, 16 × 4 μ.

Von Höhnel has re-described *Micropeltis applanata* Mont. from the type specimen (Fragmente, X., No. 479). He gives the diameter as 900 μ, the asci 100–110 × 20 μ, furnished with paraphyses, and the spores 32 × 10 μ, four to five septate.

The Ceylon species evidently belongs to Theissen's Dictyopeltineæ (Myc. Centralb., III., p. 285). It differs from Micropeltis in the absence of paraphyses and in the two-septate spores. Sydow (Ann. Myc., XI., p. 404) has instituted the genus Micropeltella for species of Micropeltis without paraphyses, but this is limited by Theissen (*loc. cit.*) to those with spores three or more septate. It would appear reasonable to extend it to include species with two-septate spores. The species may then be known as *Micropeltella Thwaitesii*.

268.—Dothidea orbis Berk.

This species, though described in the Fungi of Ceylon by Berkeley and Broome, was attributed to Berkeley only. There is only one leaf in the type. It was said to be on *Litsea*,

but Theissen and Sydow, who have re-examined the type specimen, query that determination. The original description is "Parva, orbicularis; sporidiis oblongis angustis uniseptatis. Sporidia ·0006 long." Theissen and Sydow have placed it in *Otthia*, as *Otthia orbis* (Berk.) Theiss. & Syd. (Ann. Myc., XII., p. 179), stating that the spores are brown, 18–22 × 4 μ.

Fresh specimens, identical with the type, have been collected on *Litsea zeylanica*. The fungus grows on the under-side of the leaf, the perithecia being at first scattered, then clustered in groups of about twelve, forming small discoid patches. The individual perithecia are about 0·1 mm. diameter, conoid, black, minutely rugose, ostiolate. They are seated on a thin film of agglutinated hyphæ, by which they are attached to the leaf. The cluster of perithecia and the basal stroma are superficial. The wall of the perithecium is thick, not carbonaceous, and when fresh is reddish internally. The asci are clavate, very shortly pedicellate, thick-walled at first, eight-spored, spores biseriate, 40–60 × 7–8 μ. There are no paraphyses. The spores are fusoid or subcymbiform, ends obtuse, one-septate. Spores in the ascus, from fresh specimens, were greenish hyaline, 10–15 × 2·5–3 μ; extruded spores from the same collection were hyaline, 14–18 × 4–5 μ. In the part of the type examined the spores were hyaline, 14–18 × 4–5 μ, but a single brown spore, 16 × 4 μ, was observed.

The species appears to be *Lizonia*, not *Otthia*, and will stand as *Lizonia orbis* (Berk.).

269.—Asterina micropeltis B. & Br.

Berkeley and Broome described this species, in Fungi of Ceylon, No. 1141, as "Peritheciis punctiformibus solitariis, mycelio brevi ramoso cinctis. On leaves of *Jambosa hemisphærica*." *Jambosa hemisphærica* is *Eugenia hemispherica* Wight.

The fungus occurs on the upper surface of the leaf, forming minute, superficial, scattered, black points, up to 0·5 mm. diameter. These are at first flattened convex, and when

mounted show a netted structure, which merges at the margin into a thin sheet of hyaline hyphæ running over the leaf. The hyphæ are about 4 μ diameter, sometimes constricted at the septa, and do not bear hyphopodia. Older examples are elevated in the centre, and show a developing perithecium about 0·3 mm. diameter, with a parenchymatous wall, surrounded by a dense weft of hyphæ, which merges into the hyaline hyphæ as before. The ostiolum is about 30 μ diameter. Unfortunately all the specimens in the type appear to be immature.

270.—Phoma Lobeliæ B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 802, from Thwaites 301, on *Lobelia nicotianæfolia*. Their description is "Pustulis epidermide alba tectis, demum emersis ; sporis ellipticis. Spores 3·75 μ long." The fungus grew on the dead flowering stalks of the Lobelia.

The pycnidia are lenticular, immersed in the cortex ; they are oval in plan, up to 0·5 mm. long and 0·3 mm. diameter, and 0·15 to 0·2 mm. high. They remain covered by the whitened epidermis, as a rule. The ostiolum is broadly conical, or subcylindric, short, and protrudes through the epidermis. The wall of the pycnidium is stout, black, and parenchymatous. The spores are oblong with rounded ends, 5–9 × 1·5–2 μ, and show a blue band across the middle on staining with Cotton Blue ; with these are flexuose or uncinate spores, tapering towards the ends, 14–24 × 1 μ. In modern classification this is a Phomopsis, and will stand as *Phomopsis Lobeliæ* (B. & Br.).

The co-type in Herb. Peradeniya contains principally an entirely different fungus. This forms stromata between the wood and the cortex, usually superficial on the wood, but sometimes slightly immersed in it, becoming free when the outer tissues weather off. They are small, black, irregularly pulvinate, scattered, either circular, 0·5 mm. diameter, or oval, 0·6 × 0·4 mm., often ridged, with broadly conical, obtuse ostiola, which penetrate the epidermis but scarcely project. Internally they are dark brown and parenchymatous, and contain a few, distant, globose perithecial

cavities, up to 0·25 mm. diameter. The asci are cylindrico-clavate, eight-spored, 66–80 × 10 μ. The spores are fusoid, thin-walled, fuscous, straight, five-septate, slightly constricted at the septa, 26–32 × 4 μ. This is a Melogramma, which may stand as *Melogramma Lobeliæ*.

271.—Cladosporium congestum Berk.

In Hooker's Journal of Botany, Vol. VI. (1854), p. 208, Berkeley described two species of Cladosporium, viz., *Cladosporium scopæforme* from India and *Cladosporium congestum* from Ceylon.

Cladosporium scopæforme occurred on the under-side of the leaves of *Myristica Churra*. It was described as "Cæspitulis parvis orbicularibus; floccis erectis simplicibus nodosis; sporis clavatis elongatis curvis subhyalinis. Erumpent; spots small, orbicular, sometimes scutellæform, consisting of a tuft of erect, simple flocci, which are more or less waved, and repeatedly, though not sharply, geniculate above. Spores clavate, elongated, attenuated below, nearly colourless, 0·001 to 0·002 of an inch long. A very pretty and distinct species, with the habit of a minute Circinotrichum. If the spores were septate it would come very near to Corda's genus Helicoryne." The host plant is probably *Myristica gibbosa* Hk. f. & Th., which was collected near Churra.

Cladosporium congestum occurred on the under-side of leaves of Litsea. It was described as "Cæspitulis parvis orbicularibus, floccis erectis simplicibus, sporis brevioribus clavatis curvis subhyalinis. Spores not exceeding 0·001 inch. Thread even, not nodulose. Closely allied, but distinct."

In the Fungi of Ceylon (Jour. Linn. Soc., XIV., p. 99) Berkeley and Broome recorded for Ceylon both *C. scopæforme* and *C. congestum*. The former was said to grow on leaves of *Cinnamomum zeylanicum*, and to have spores 0·002–0·0025 inch long. The latter was on leaves of Litsea, and had "floccis tenuibus flexuosis; sporis oblongis curvulis trinucleatis," with the "habit of the former."

Reference to the Ceylon specimens in Herb. Kew shows that there is only one specimen of *C. congestum*; it is marked "on Litzæa, Ceylon," and has no date or collection number.

Under *C. scopæforme* in Herb. Kew are a Ceylon specimen without date or collection number ; another, Thwaites 424 ; and a third, Thwaites 485. Most of these unnumbered Ceylon specimens were sent by Thwaites in 1854, so that it is probable that Berkeley had the undated Ceylon specimen of *C. scopæforme* at the time he published the description of that species.

The Ceylon specimens of *C. scopæforme* and *C. congestum* are identical. I regret that, being under the erroneous impression that the Ceylon specimen was the type, I did not examine the Indian specimen of *C. scopæforme* on Myristica, but if Berkeley's description is correct, that species cannot be the same as *C. congestum*, for the latter is not erumpent, and its conidiophores are not nodulose. It is possible, however, that Berkeley's " nodosis " means geniculate.

In Fungi of Ceylon, No. 1177, Berkeley and Broome enumerated *Meliola zigzag* B. & C., citing Thwaites's numbers 424 and 485. These, it will be noted, are the numbers now included in Herb. Kew under *C. scopæforme*. In the cover of *Meliola zigzag* in Herb. Kew there is part of Thwaites 424 only.

Meliola zigzag, or, as the name was published, *Meliola zigzac*, was described by Berkeley in " Cuban Fungi," No. 882 (Jour. Linn. Soc., X. (1869), p. 392), as " Floccis repentibus confervoideis, articulis utrinque emarginatis obliquis ; peritheciis setis acutis tenuibus curvulis cinctis ; sporidiis magnis, conidiis helminthosporoideis triseptatis utrinque appendiculatis. Sporidia 0·002 inch long ; conidia 0·0016. The flocci are very peculiar."

Meliola zigzag was re-described by Gaillard (Le Genre Meliola, p. 81) from part of the type specimen, Cuba 882. He described the mycelium as possessing hyphopodia and setæ, and gave the dimensions of the perithecia and spores. After the description, Gaillard added the following observation : " Nous avons fait cette description d'apres un spécimen des Fungi Cubenses, n. 882 ; l'appareil conidifère etait imparfaitement développé, et se rédusait au mycelium. Berkeley indique dans sa description ; Conidiis helminthosporoideis, 40 μ long., triseptatis, utrinque appendiculatis. Les ' floccis repentibus confervoideis, articulis utrinque emarginatis

obliquis' ne sont certainement autre chose que les soies conidifères, qui ont cette form dans un certain nombre d'espèces."

On looking up the Ceylon specimen of *Meliola zigzag* in Herb. Kew, it is at once seen that the greater part of the fungus on the leaves is *Cladosporium congestum*. There is, in addition, a fungus which forms very thin, cloudy, black patches. The latter patches consist of repent, interlacing hyphæ, 3–4 μ diameter, sometimes united into strands; the hyphæ are fairly regular, are destitute of hyphopodia, and bear a few scattered, erect, simple, conidiophores, up to 70 μ high. These cloudy patches are much larger than the Cladosporium patches, and can scarcely be an immature state of the latter. The leaves also bear black, compact patches, up to 1 mm. in diameter, consisting of a basal layer of interwoven, thin, black hyphæ; in this layer occur immature perithecia, crowded together and ultimately completely covering it. These appear to be immature *Dothidea orbis* (Berk.). Whether either of these is what Berkeley and Broome attributed to *Meliola zigzag* is uncertain, but there is apparently nothing which approaches Gaillard's description of the Cuban fungus.

The description of *Meliola zigzag* was published in 1869, at a time when Berkeley already had in his possession the bulk of the Thwaites's collection of Ceylon fungi. In view of Gaillard's note, it would seem possible that the description of *Meliola zigzag* includes details from the Ceylon specimens of *Cladosporium congestum*.

Cladosporium congestum forms lax, blackish-brown tufts of hyphæ, up to 1 mm. diameter, or larger by confluence. The whole tuft is superficial, and separates from the leaf like the mycelium of a Meliola. The hyphæ are blackish-brown, sub-erect, regular, about 4 μ diameter, septate, flexuose above, up to 1 mm. long. At the base of the tufts are compact, nodular masses of mycelium, from which some of the erect hyphæ arise. Perithecia were not found. The smaller conidia are blackish-brown, cylindric, often curved, two to three septate, 24–33 × 4–6 μ; the larger are clavate, curved or sigmoid or straight, strongly attenuated, and almost hyaline below, four to six septate, 44–60 × 6–8 μ.

272.—Rhinotrichum globiferum B. & Br.

This species was described from Thwaites 61 as "Aureum : floccis ramosis, parce articulatis ; sporis sparsis globosis."

The fungus, in the co-type in Herb. Peradeniya, forms effused, thin, lax, velvety, rufous-brown patches. The hyphæ are irregularly intertwined, flexuose, yellow-brown, and vary from 7 to 12 μ in diameter. The distance between the septa is usually from 40 to 60 μ, and the segments may be either strongly inflated or even. The conidia are borne laterally on short persistent pedicels along the terminal segments, the last segment being sometimes inflated into an ovoid head, about 16 × 14 μ, or on similar pedicels on short, elongated, ovoid, lateral branches ; they are globose, yellow-brown, smooth, internally granular, 13–16 μ diameter.

This is a Physospora, and will stand as *Physospora globifera* (B. & Br.). The hyphæ and spores are paler, and have thinner walls, than those of the Ceylon species attributed to *Physospora spiralis* Penz. & Sacc., and the terminal segments are shorter and differ in shape. The conidia of the latter species, in Ceylon specimens, are always minutely warted.

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A New Variety of Exacum zeylanicum Roxb.

BY

T. PETCH, B.A., B.Sc.

IN the course of a botanical excursion to Kunadiyaparawitta at Christmas, 1917, Mr. F. Lewis collected a white Exacum, which differed from *Exacum Walkeri* Arn. in that the flowers were pure white, without the green "eye" which characterizes that species. Further examination of the specimen shows that it closely approaches *Exacum zeylanicum* in most details, and it may, at least provisionally, be regarded as a variety of the latter.

The leaves are up to 6·5 cm. long, narrow-lanceolate, and usually strongly attenuated towards the tip. In some specimens the leaves are crowded, the consecutive pairs of leaves being 1·5–2·5 cm. apart, but in others they are distant, and up to 5 cm. apart. The arrangement of the leaves in the former specimens approaches that of specimens of *E. zeylanicum* collected by Trimen on Pidurutalagala at 7,400 feet.

The flowers are few, and the inflorescence lax. The largest available inflorescence bears only eight flowers, and the branches of the inflorescence usually terminate in single flowers. The petals are white, oval, obtuse or subacute, not differing in shape from those of *Exacum zeylanicum*.

The only structural difference which separates this form from *Exacum zeylanicum* is the shape of the anther. In *E. zeylanicum* the anthers are, normally, long and attenuated upwards, frequently attaining a length of 6 mm.; and they are furnished with terminal pores. In the white form under notice they are comparatively short and stumpy, about 4 mm. long, not noticeably attenuated, and the apex of the anther is curved towards the inner face, so that the pores are subterminal or almost lateral. In their short stumpy form

these anthers resemble those of *Exacum zeylanicum var. pallidum*, but the tips of the anthers in the latter are not curved.

In *Exacum Walkeri* the anthers are short and stumpy, but, in the dried herbarium specimens, they exhibit a feature which at once separates them from *E. zeylanicum*. On drying, the furrow on the outer face assumes a V-shape at the apex, and immediately above this is a minute tubercle formed of clavate cells, up to 80 × 30 μ, with free, rounded ends.

White forms of *Exacum zeylanicum* have not been previously recorded. Trimen, in Flora of Ceylon, III., 182, under *E. macranthum*, wrote: "A remarkable white variety was gathered (by Miss Baker) in 1882, with pure white flowers, having the corolla segments jagged at the margins." The specimen is not now in Herb. Peradeniya.

It is proposed to call the present form *var. Lewisii*, characterized by its white flowers and incurved anthers.

Explanation of Plate.

FIG. 1.—Anther of *Exacum zeylanicum var. Lewisii*, outer face.

FIG. 2.—Anther of *Exacum zeylanicum var. Lewisii*, inner face.

FIG. 3.—Anther of *Exacum zeylanicum var. Lewisii*, latera view.

FIG. 4.—Anther of *Exacum Walkeri*, outer face.

FIG. 5.—Anther of *Exacum Walkeri*, inner face.

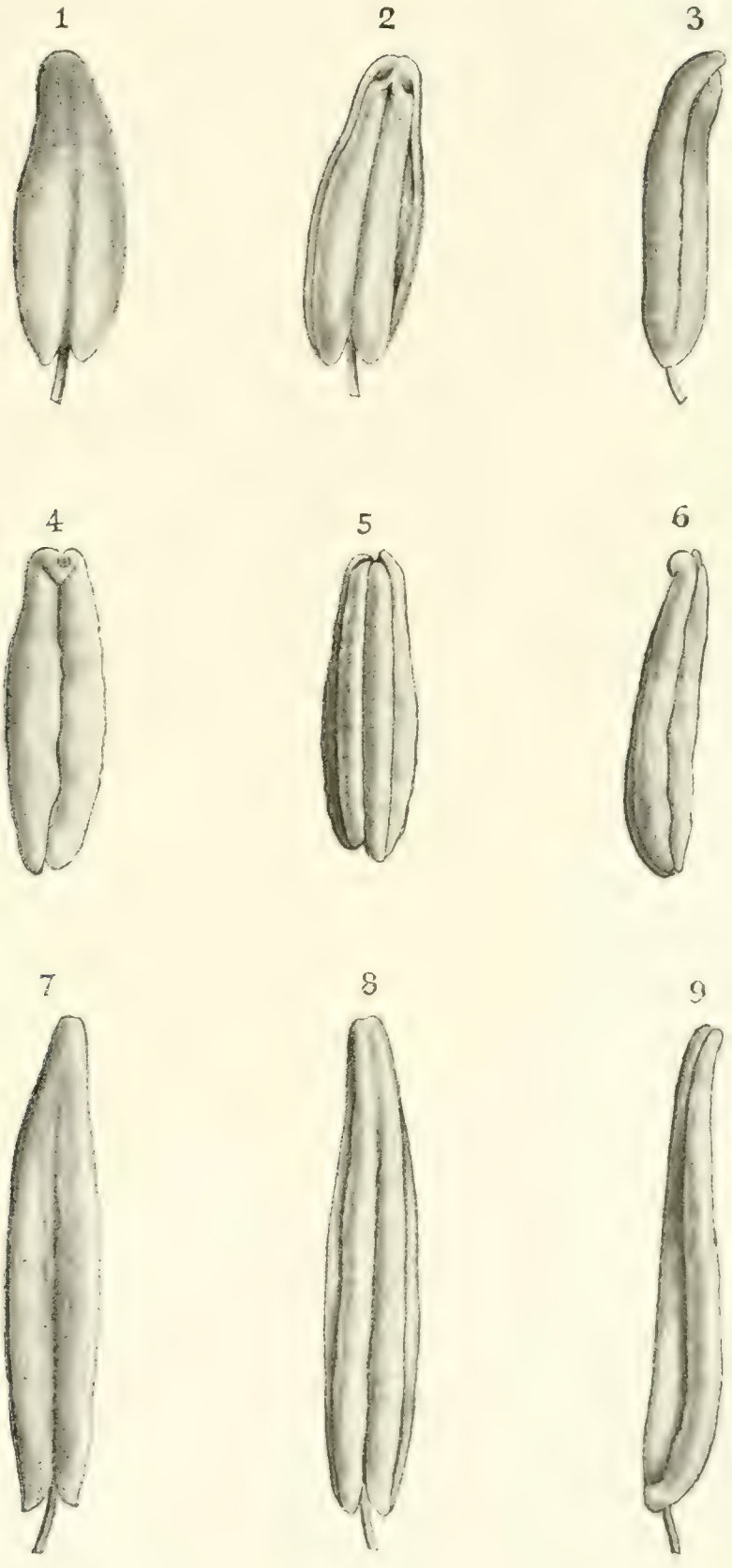
FIG. 6.—Anther of *Exacum Walkeri*, lateral view.

FIG. 7.—Anther of *Exacum zeylanicum*, outer face.

FIG. 8.—Anther of *Exacum zeylanicum*, inner face.

FIG. 9.—Anther of *Exacum zeylanicum*, lateral view.

All figures drawn from herbarium specimens and enlarged seven diameters.



ANTHERS OF EXACUM.

Oxalis in Ceylon.

BY

T. PETCH, B.A., B.Sc.

IN many of our up-country tea districts the weed *par excellence* on tea estates is Oxalis, or Manickwatte weed, usually, when a scientific name is required, known as *Oxalis violacea*. The name Manickwatte weed is derived from Manickwatte estate, where, in 1890, the tea fields formerly in coffee were said to resemble clover fields if left for any length of time unweeded, owing to the growth of this plant. (Peradeniya MSS.) As in the case of many other common weeds, its origin in Ceylon is by no means clear, and the evidence on the point is largely negative. The following account summarizes what is available.

To begin with, it may be pointed out that, in addition to the native yellow-flowered *Oxalis corniculata*, the *Hin-emul-embiliya* of the Sinhalese, there are two species of Oxalis occurring as introduced weeds in Ceylon. This fact was known to Trimen, but it has been most unaccountably overlooked by later botanists. In Trimen's "Hortus Zeylanicus," published in 1888, he listed the two, one as *Oxalis latifolia* H.B.K., and the other, with a query, as *Oxalis violacea* L. The query mark was probably misplaced by the printer, for on the herbarium specimens named by Trimen it is attached to the one assigned to *O. latifolia*. It has previously been recorded that the latter, which is the common Manickwatte weed, is *Oxalis corymbosa* DC. (Ann. Perad., V., 541), and this identification has now been confirmed by Kew. The other, less common species, which is the *Oxalis violacea* of Trimen's "Hortus Zeylanicus," has been identified by Kew as *Oxalis latifolia* H.B.K. As far as is known, *O. violacea* is not found in Ceylon.

Oxalis violacea was recorded as growing in Ceylon by Moon in his "Catalogue of the Indigenous and Exotic Plants growing in Ceylon," published in 1824. It was one of the plants which had not been recorded by any one previously, and, as with very many of the plants recorded for the first time by Moon,

it was a garden plant. This is evident from the locality cited by Moon, viz., North America, and from a note "from Bourbon," in Moon's handwriting, in his copy of Willdenow in the Peradeniya library. Moon gave a native name for it, *Rata-embul-embiliya* (in modern spelling), but this is an obvious coinage from the native name of the yellow-flowered Oxalis. Unfortunately we cannot get any further from Moon's record, for the reason that there is no herbarium specimen extant. The Director of the Royal Botanic Gardens, Kew, who has kindly had inquiries made, informs me that there is no specimen of Oxalis collected by Moon, either in the Kew herbarium or in that of the British Museum (Natural History). Consequently we do not know whether Moon had *Oxalis violacea*, or *O. corymbosa*, or *O. latifolia*. But as it was introduced from Bourbon, it was probably *O. corymbosa*.

Presumably Moon's plant was then growing in the Botanic Gardens at Peradeniya. Both the species now common are rather up-country weeds, *O. latifolia* more so than *O. corymbosa*. But both occur, and have occurred for the last thirty years, as weeds in the Peradeniya Gardens. There *Oxalis latifolia* is small, spreads very slowly, and is apparently not found outside the Gardens, but *O. corymbosa* is more vigorous, and may be found along the road-sides and on tea estates in the neighbourhood. But the latter is not yet a serious weed at this elevation. The diminution in its colonizing ability as *O. corymbosa* approaches its lower limit is very clearly evident on estates which extend from about 1,500 feet to 3,500 feet elevation. On the upper fields *Oxalis corymbosa* may be rampant, while on the lower fields only a few scattered plants are to be found, though the individual plants seem vigorous enough.

Neither of these species of Oxalis was collected by Gardner or Thwaites (1844–1880). The first specimens placed in the Garden herbarium, which is supposed to contain all the foreign plants, cultivated or weeds, which grow in the Gardens, are dated 1887 and marked "weed." They include both species. It may, I think, be deduced from this, and the evidence which follows, that Moon's species, whether *O. violacea* or not, did not long survive its introduction, and is not the source of the weeds of the present day.

For nearly sixty years after the publication of Moon's book we have only negative evidence. Gardner, in 1848, published a paper, entitled "Some General Remarks on the Flora of Ceylon," in which he enumerated the common introduced weeds, but he did not mention Oxalis. Thwaites did not refer to *Oxalis corymbosa*, or any similarly-coloured species, in his "Enumeratio Plantarum Zeylaniæ," published 1864, though he gave a list of the commoner foreign weeds in the preface. Six years later Thwaites enumerated the common plants at Hakgala in a letter to W. Ferguson, who was then about to visit the Gardens there on a collecting trip; in it he states that the introduced *Erigeron linifolius* is worse than Ageratum at Hakgala (December 9, 1870). Evidently Oxalis was not a weed there then.

The first record of Oxalis as a weed is contained in a letter from W. Ferguson, dated October 31, 1882, to Dr. Trimen, who was just starting on a visit to Lindula. Ferguson wrote: "I saw Mr. Sinclair this morning, and he will be with you at Peradeniya to-morrow morning, and drive you from Nawalapitiya, which will be much nicer in every way than going in the coach. I have asked him to point out the rose-flowered Oxalis which has escaped and spread for some miles along the road-side beyond where the horses are changed in Kotmale. You will see it on your left-hand side going up." Apparently this was new to Ferguson, though he had botanized over the Island for about thirty years. We have no specimen from Kotmale in 1882, and consequently cannot say positively which species this was. But as the Kotmale weed is now *O. corymbosa*, it was most probably that species.

Both *O. latifolia* and *O. corymbosa* were collected as weeds in the Botanic Gardens, Peradeniya, in 1887, but neither has ever given serious trouble there. At Hakgala Oxalis did not become worthy of note until 1892; in the Annual Report for that year it is stated that "the imported weed *Oxalis violacea* has become a real pest." Both species now occur at Hakgala, but *Oxalis latifolia* is, or was up to 1914, certainly the more abundant.

The date of introduction of *Oxalis latifolia* at Hakgala is not known. It was grown there at first under the name of

Oxalis Deppei, and was advertised for sale under that name as a vegetable in 1879 (Morris, Catalogue of ..... Trees, &c., suitable for distribution). In 1908 it was re-introduced under the name of *Oxalis brasiliensis*.

On the evidence available it would appear that *Oxalis latifolia* was introduced by the Botanic Gardens, prior to 1879, and it is not yet a serious weed, except at Hakgala. The common pest of tea estates is *Oxalis corymbosa*, and this began to spread, about 1882, from a centre in Kotmale.

The following are the more obvious points of difference between the two species. In *O. latifolia* the sides of the leaflets are straight, or nearly so, so that the leaflets are triangular, while in *O. corymbosa* the sides of the leaflets are rounded. When young the leaflets of *O. latifolia* are frequently marked with purple streaks, but in large full-grown specimens they are, if anything, paler than those of *O. corymbosa*. In stunted specimens of *O. latifolia* the leaves may be violet underneath. The leaf-stalk of *O. latifolia* is glabrous, that of *O. corymbosa* hairy. The inflorescence of *O. corymbosa* is branched, that of *O. latifolia* simple.

In the flower the coloured area of the petal in *O. latifolia* is sharply differentiated from the lower greenish part, but in *O. corymbosa* there is a gradual transition from the greenish base to the purple-rose colour above, and the petals are strongly veined. In all the Ceylon specimens examined the styles of *O. corymbosa* are intermediate in length between the two sets of stamens, and are bent outwards above at an angle of about 30° ; in *O. latifolia* the styles are shorter than, or almost as long as, the lower set of stamens, and are bent outwards almost at right angles.

Oxalis corymbosa produces bulbils at the apex of the "carrot." *Oxalis latifolia*, as a rule, produces short white runners underground, each of which bears a bulbil at its extremity ; but when the plant is growing on the surface of the soil, these runners are more or less suppressed or shortened, and the bulbils then have the appearance of being developed in the same way as those of *O. corymbosa*. Seeds have not been found in either species in Ceylon.

In the Journal of Botany, LVI., p. 122, M. J. Godfrey, reviewing Sommier and Galto's Flora Melitensis Nova, makes the following comment: "Another interesting plant is *Oxalis cernua*, a trimorphic species from the Cape of Good Hope, of which only the short-styled form grows in Malta. It was first mentioned by Giacinto in 1806 in a list of plants in the Malta Botanical Gardens. To such an extent has it spread that the fields are yellow with it, as fields at home sometimes are with charlock, and it is found everywhere, on the walls, by the road-sides, and in such abundance that it far exceeds all the other flowers together. The extraordinary thing is that all this immense profusion of flowers results in no production of capsules, the other forms capable of fertilizing the ovary being absent. The authors of the Flora, one of whom has lived in Malta all his life, state that they have never seen it in fruit. It appears, however, that recently it has been found at Naples and Palermo with mature seeds, and it has been suggested that possibly, after its long isolation, it has acquired the faculty of being fertilized by pollen of the same form. This has not occurred at Malta, where it has been much longer established, and it would seem more probable that one of the other forms may have been cultivated in gardens at Naples and Palermo, or that it may have been fertilized from some other garden species. A form with double flowers is very abundant in Malta and Lampedusa, which furnishes confirmation of Darwin's theory that sterility is the exciting cause of double flowers. It is curious that such an immense amount of energy should be wasted in the production of useless flowers. One would have thought they would tend to disappear when the method of propagation became purely vegetative, *i.e.*, by the bulbils on the roots."

Though double flowers have not been observed on either *Oxalis latifolia* or *O. corymbosa* in Ceylon, they present in other respects an exact parallel to *O. cernua* in Malta. Neither has ever been found to bear capsules, but both flower freely, and *O. corymbosa* has spread all over the up-country districts, while *O. latifolia* promises to be equally abundant at the highest elevations.

Alocasia indica Schott.

BY

T. PETCH, B.A., B.Sc.

Alocasia indica was recorded as a cultivated plant in Ceylon in Flora of Ceylon, IV., p. 360, in a note which states : "*A. indica* Schott, *Rata-ala*, *Desi-ala*, S., is much cultivated ; it is closely allied to *A. cucullata*, but has deeply sagittately cordate leaves, 2–3 feet long, narrower spathe, longer spadix, with the appendage longer than the inflorescence." It was not recorded for Ceylon in Flora British India.

The fourth volume of the Flora of Ceylon was completed after Trimen's death by Sir J. D. Hooker. There is consequently some doubt as to the authorship of the note quoted. Some of the notes in Vol. IV. are followed by Trimen's name, others by the initials J. D. H. ; but that one is unsigned.

Trimen included *Alocasia indica* Schott, *Rata-ala*, in his "Hortus Zeylanicus," published 1888. Thwaites, in his "Enumeratio Plantarum Zeylaniæ," stated that *Colocasia indica* was cultivated in native gardens as a vegetable. As Thwaites throughout uses Colocasia instead of Alocasia, he doubtless meant *Alocasia indica* Schott.

In seeking confirmation of the statement that *Alocasia indica* is cultivated in Ceylon, it is found that there is no herbarium specimen from Ceylon either at Kew, the British Museum, or Peradeniya. The only recorded specimen is one collected by Thunberg in Ceylon in 1777–8, and now in his herbarium in Herb. Upsala. According to the evidence, that specimen was determined by Schott.

Schott's original description of *Alocasia indica*, in Oest. Bot. Wochenbl., 1854, p. 410, does not cite the Upsala or any other specimens. Engler, in De Candolle, Mon. Phan., II., 1879, gives Ceylon as a locality for *Alocasia indica*, and cites "Thunberg in Herb. Upsal."

A list of the plants in Thunberg's herbarium, with details of the data on the herbarium sheets, has been published by Professor H. O. Juel, under the name "Plantæ Thunbergianæ."

From that book it appears that Thunberg collected three species of "Arum" in Ceylon, viz., *Arum peregrinum* L., *Arum macrorhizon* Thunb., and *Arum ceilanicum*.

Arum peregrinum L. is *Alocasia macrorrhiza* (L.) Schott. The sheet in Herb. Thunberg bears two specimens, but only the locality Ceylon, though Thunberg enumerated this species in Florula Javanica. According to Schott (in Herb. Thunberg), the specimen is an undetermined Homalomena. If so, it is not a Ceylon specimen, no species of Homalomena being known in Ceylon.

Arum macrorhizon Thunb., according to the herbarium specimens, is a mixture, the Java plant of Florula Javanica, 1825, being different from that of Florula Ceilanica, 1825. The latter is marked Ceilan by Thunberg, but according to Schott's note on the sheet it is *Leucocasia gigantea* Schott [=*Colocasia gigantea* Hook.=*Colocasia indica* of Engl., Araceae, 494 (non Kunth), according to the synonyms in Flora British India]. Here, again, assuming the identification to be correct, this cannot be a Ceylon specimen.

With regard to the third species, which is the one particularly in question, this was named *Arum ceilanicum* by Thunberg on the herbarium sheet, but the name was not published. According to Juel, the data on the sheet are "*Arum ceilanicum* Ceil." "*Colocasia indica* Schott"; that is, Thunberg wrote "*Arum ceilanicum*" on the front of the sheet, and the locality "Ceilan" on the back, while Schott subsequently added the identification "*Colocasia indica* Schott."

Through the friendly offices of the Director of the Royal Botanic Gardens, Kew, Professor Juel has kindly furnished a photograph of this herbarium sheet. It bears the name *Arum ceilanicum*, as written by Thunberg, in the lower right-hand corner, and, in the middle of the sheet at the bottom, a ticket inscribed "*Colocasia indica* Schott. Scrips. et determin. Schott." The two parts of this inscription appear to be in different handwritings. At the right-hand corner of the sheet is a small slip of paper, stuck on perpendicular to the base, with the inscription, "Habaralle (mal)."

Juel states that Thunberg first mounted his plants on sheets 210 × 330 mm., and subsequently removed them to

sheets 240 × 370 mm. "In many cases he tore off the lower edge of the old sheet, on which remarks (as, for example, on native medicinal uses) were inscribed, and affixed it to the new sheet." The slip referred to above would appear to be one of these, for *Habarala* is the Sinhalese name, not Malay, of *Alocasia macrorrhiza* Schott. It may be noted that Thunberg frequently cites Malay names as Sinhalese, and *vice versâ*.

The herbarium sheet bears two inflorescences, one minus the spathe, and a leaf. The leaf is unfortunately folded over, and the attachment of the petiole is not evident on the photograph. Of the two inflorescences, the appendage of one is very much shorter than the male portion of the spadix, while that of the other is slightly longer than the male part of the spadix, but less than the total length of the male and female parts combined. The whole spadix is nearly as long as the spathe.

The relative lengths of the parts of the spadix do not agree with the figure of *Arum indicum* in Wight, Icones, 794, nor with the usual description that the appendage is longer than the inflorescence; on the other hand, they correspond well with specimens of *Alocasia macrorrhiza* in the Peradeniya herbarium. As far as can be determined from the photograph, the specimens are *Alocasia macrorrhiza*, and the Sinhalese name *Habarala* is correctly applied.

It may be noted that *Alocasia macrorrhiza* is one of the common cultivated species in Ceylon, and that it is not otherwise represented in Thunberg's collection.

The Sinhalese name, *Rata-ala*, merely means "foreign yam." At the present day *Rata-ala* and *Desi-ala* are applied, as far as can be ascertained, to a species of Xanthosoma; and Mr. H. L. van Buuren, who is engaged upon an investigation of the Ceylon species of Alocasia, &c., has not been able to find *Alocasia indica*. We have, therefore, no evidence that this species is grown in Ceylon.

Gasteromycetæ zeylanicæ.

BY

T. PETCH, B.A., B.Sc.

THE following list comprises the Gasteromycetæ known to occur in Ceylon, and includes species recently collected, in addition to those recorded by Berkeley and Broome. Papers on the Phalloids have previously been published in the Annals of the Royal Botanic Gardens, Peradeniya, Vol. IV., pp. 139–184, and V., pp. 1–21; and a further description of *Lysurus Gardneri*, under the new name of *Pharus Gardneri*, will shortly appear in the Transactions of the British Mycological Society.

I am indebted to Mr. C. G. Lloyd for the determination of very many of the species, and for liberal assistance in private correspondence, as well as in his valuable publications.

Phallaceæ.

Mutinus.

Mutinus bambusinus (Zoll.) Fischer. Peradeniya, May, 1912; a single specimen; abundant, October 29–November 23, 1914.

Mutinus Fleischeri Penz. Hakgala, August, 1908.

Jansia.

Jansia proxima (B. & Br.). A figure of this species was sent to Berkeley and Broome, and was marked by them *Phallus proximus*, but they did not publish it. Massee published a description, under the name *Mutinus proximus*, in Grevillea, XIX., p. 94.

Peradeniya, January, 1869 (Thwaites); November–December, 1906.

Ithyphallus.

Ithyphallus tenuis Fischer. According to Fischer (Neue Untersuchungen, 1893) there are specimens of this species from Ceylon in Herb. Kew and Herb. British Museum, marked *Phallus pallidus* Berk. It is common in the jungle at Hakgala on decaying logs in hundreds at a time.

Dictyophora.

Dictyophora phalloidea Desv. Recorded for Ceylon as *Phallus dæmonum* Rumph. by Berkeley in Hooker's Lond. Jour. of Botany, VI. (1847), and as *Dictyophora dæmonum* Lév. by Berkeley and Broome in Fungi of Ceylon, No. 698.

Common in the low-country (wet zone) up to an elevation of 1,600 feet. A small form with a bright orange-yellow cap occurs at Peradeniya.

Clautriavia.

Clautriavia irpicina Pat. Common, with the same distribution as *Dictyophora phalloidea*. Abundant at Henaratgoda.

Clathrus.

Clathrus crispatus Thw. Recorded for Ceylon by Berkeley as *Clathrus cancellatus* L. in Hooker's Lond. Jour. of Botany, VI. (1847), and by Berkeley and Broome in Fungi of Ceylon, No. 700.

In shady forests, 1844 (Gardner). Hantane, August, 1859 (Thwaites). Hakgala, April, 1907; May, 1913; January, 1914. Ythanside, April, 1909; July, 1913. Not found below 4,000 feet.

Clathrella.

Clathrella delicata (B. & Br.) Fischer. Described as *Clathrus delicatus* by Berkeley and Broome in Fungi of Ceylon, No. 699.

Peradeniya, November, 1868 (Thwaites); August, October, 1906.

Simblum.

Simblum periphragmoides Klotzsch. Recorded for Ceylon as *Simblum gracile* Berk. by Berkeley in Hooker's Lond. Jour. of Botany, V., p. 534, and VI. (1847), p. 512; and by Berkeley and Broome, under the same name, in Fungi of Ceylon, No. 702.

Peradeniya, August, 1844 (Gardner); 1854 (Thwaites). Fairly frequent at Peradeniya.

Pharus.

Pharus gen. nov. Receptaculum stalked; stalk dividing above into arms, which normally unite at the apex; glebiferous layer borne solely on the arms, and consisting of numerous plicate processes and plates, perpendicular to the arm, closely packed together, and presenting a granular outer surface, similar to that of Clautriavia.

Pharus Gardneri (Berk.). *Lysurus Gardneri* Berk., Hooker's Lond. Jour. Bot., V., p. 535, and VI. (1847), p. 512. *Lysurus* (*Desmaturus*) *Gardneri* Schlect., Linnæa, 31 (1861–62), p. 180. *Colus Gardneri* (Berk.) Ed. Fischer, Vers. e Syst. Uebers., p. 77 (1886), and Sacc., Sylloge, VII., p. 21. *Lysurus Gardneri* Berk., in Lloyd, Synopsis of the known Phalloids. Not *Lysurus Gardneri* Berk., in Cleland and Cheel, Notes on Australian Fungi, No. 2, Jour. Proc. Roy. Soc. N. S. W., XLIX., p. 204; LI., p. 364.

Peradeniya, 1835 (Watson); (Gardner); July, 1868 (Thwaites); June, 1906; July, 1907; May, 1909; July, 1909; November, 1914; May, 1918.

Aseroe.

Aseroe rubra La Bill. Recorded as *Aseroe zeylanica* Berk. by Berkeley in Hooker's Lond. Jour. of Botany, V., p. 535, and VI. (1847), p. 512; and under the same name by Berkeley and Broome in Fungi of Ceylon, No. 701. "On the ground, 4,000–5,000 feet, Gardner, Thwaites."

Dunsinane, Pundaluoya, August, 1907. Hakgala, September, 1908; August, 1909, &c. Bandarawela, December, 1907. Ythanside, June, 1911. Fairly common above 4,000 feet, both in the jungle and on estates among tea.

Aseroe arachnoidea Fischer. Peradeniya, June, 1905.

Protubera.

Protubera maracuja Moller. Hakgala (5,600 feet), September, 1908; May, 1910. Nuwara Eliya (6,200 feet), September, 1908, abundant. Not yet found at lower elevations.

NIDULARIACEÆ.

Nidularia.

Nidularia reticulata n. sp. In Fungi of Ceylon, No. 729, Berkeley and Broome recorded for Ceylon, *Nidularia Duriæana* Tul., from Thwaites 1022, which, according to the herbarium specimen, was collected at Peradeniya. Part of the Peradeniya herbarium specimen was submitted in 1906 to Lloyd, who states that it is certainly not *Nidularia Duriæana*, but an unnamed species, differing from all others in the spiny branching fibrils of the peridiole walls (Letter 19). It is described here as *Nidularia reticulata.*

The peridia are now pale brown, pulvinate, up to 4 mm. diameter, with a membranous wall. The peridiola are discoid, circular, flat, pale brown, up to 0·75 mm. diameter. By transmitted light they show a central circular brown opaque area, 0·4 mm. diameter, surrounded by a broad semi-transparent outer zone. The actual peridiole is only about 0·4 mm. diameter, while its outer coat is 0·75 mm. diameter. The peridiole is easily shelled out from its outer coat. This outer coat consists of a thin weft of spinous yellow hyphæ, those of the ground layer being slender, while over or among them are stout, thick-walled spinous hyphæ, up to 12 μ diameter, which form a network, particularly towards the rim, where they unite into a strong, rigid, marginal ring.

Berkeley and Broome gave the dimensions of the spores as 7·5 × 5 μ. The Peradeniya herbarium specimens appear to be immature.

The peridioles of this species, as noted by Lloyd, have some resemblance to those of *Nidula emodensis.* They differ in having a membranous peripheral zone (which, however, may not occur in mature examples), and in the more regular netted arrangement of the coarse hyphæ.

Nidula.

Nidula emodensis (Berk.) Lloyd. Recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 728, as *Cyathus emodensis* Berk., from Thwaites 1223, collected on Horton Plains. It was collected again (No. 2147) in October, 1906, at Pattipola. The two localities are within four miles of one another.

The peridia are urceolate, white, 6 mm. high, 5 mm. diameter below, expanding near the mouth to 6 mm. diameter, externally strigose, with long rigid hairs, which are sometimes fasciculate. The peridiola are 1·5–2 mm. diameter, circular, flattened, dark brown. The outer coat is easily peeled off; it consists of stout red-brown hyphæ, up to 14 μ diameter, thick-walled or almost solid, branching dichotomously, with short, spiny, lateral branches overrunning an interwoven felted layer of thinner yellow-brown hyphæ of the same character, bound together by a gelatinous substance. When the outer coat is removed the peridiole is rather pale reddish-brown. The inner peridiole wall is dark red-brown, shading to hyaline internally. The spores are thick-walled, greenish-hyaline, oval, or generally slightly pyriform, 6–8 × 4–5 μ, with a few globose 5 μ diameter.

Cyathus.

Cyathus Poeppigii Tul. No. 2143, Gangaruwa, July, 1906, spores up to 40 × 25 μ; det. Lloyd. No. 2657, Kotagala, September, 1908. No. 2134, Peradeniya, December, 1906, spores 20–30 × 16–24 μ. No. 2375, Gatembe, April, 1907, spores 24–32 × 16–20 μ.

No. 2143 was referred to *C. Montagnei* by Massee.

This species, judging from the available collections, is not as common in Ceylon as the next.

Cyathus limbatus Tul. Thwaites's specimen, No. 185, recorded by Berkeley and Broome as *C. Montagnei*, is this species; its spores are 16–22 × 8–10 μ.

No. 2145, Peradeniya, June, 1905, spores 18–24 × 12–16 μ: referred to *C. Montagnei* by Massee. No. 2476, Dunsinane, August, 1907, spores 18–22 × 8–9 μ. No. 3380,

Peradeniya, January, 1912, spores 14–16 × 8–12 μ. No. 3965, Hakgala, April, 1914, spores 16–22 × 8 μ, occasionally 20 × 16 μ. No. 4342, Haputale, spores 17–24 × 9–10 μ, some globose 10 μ. No. 5129, Henaratgoda, August, 1916, spores 15 × 8 μ. No. 5494, Deviturai, August, 1917, spores 14–18 × 8–10 μ, some globose 10–12 μ diameter. No. 2666, Peradeniya, October, 1908, spores 13–20 × 8 μ. No. 2883, Peradeniya, July, 1909, spores in one peridiole 15–19 × 8–12 μ, in another up to 21 × 14–15 μ. No. 3038, Peradeniya, 1909, spores 15–24 × 8–12 μ. No. 3853, Peradeniya, December, 1913, spores 12–17 × 6–8 μ.

The spores are oval, usually with almost parallel sides.

Cyathus striatus Hudson. No. 2324, on elephant dung, Hakgala, March, 1907; det. Lloyd. No. 5557, on elephant dung, Hakgala, December, 1917.

Lloyd, Letter 17, writes of this form: "Differs from the European plant in having larger, narrower, more scabrous cups, and much smaller spores —7 × 12. The spores of the type form are 8–10 × 18–20, hence for those who base new species largely on spore measurements it is a marked species. I can see nothing in it, however, but a form of striatus."

The two collections are identical, and it has not been found elsewhere or on a different substratum. The cups are up to 18 mm. high, usually conico-cylindric, about 2 mm. diameter at the base and 7 mm. diameter at the mouth. The spores vary from 12 × 7 to 5 × 4 μ.

Cyathus stercoreus Schw. No. 2136, on deer dung, Pattipola, October, 1906; det. Lloyd.

Cyathus triplex Lloyd. No. 2144, Peradeniya, October, 1906; det. Lloyd. No. 2135, Middlemarch, October, 1906, spores 16–20 × 9–10 μ; det. Lloyd. No. 2146, Peradeniya, June, 1906, spores 20–25 × 10 μ. No. 3854, Peradeniya, November, 1913, spores usually 15–16 × 10–12 μ, but one 24 × 10 μ. No. 4363, Peradeniya, December, 1914. No. 5556, Warriapolla, January, 1918, spores 16–24 × 10–12 μ.

At first shaggy or strigose with pale brown fascicles of hairs, becoming glabrous or nearly so, especially towards the top. In 2146 the old specimens are adpressed silky, the young specimens strigose ; Massee referred this gathering to *C. vernicosus*. It is frequently found on decaying Mango stones.

Sphærobolus.

Sphærobolus stellatus Tode. Hakgala, fairly frequent. Pattipola.

Sphærobolus rubidus B. & Br. On elephant's dung, Nuwara Eliya, Thwaites 312 ; Hakgala, April, 1907. Re-described, Ann. Perad., IV., p. 63.

LYCOPERDACEÆ.

Podaxon.

Podaxon pistillaris Fr. In "Monograph of the Genus Podaxis" (Jour. of Botany, 1890, p. 76) Massee recorded for Ceylon *Podaxis axata*, citing a specimen said to have been sent by Gardner. It was not enumerated by Berkeley in the published list of Gardner's fungi, nor by Berkeley and Broome in the Fungi of Ceylon.

There is a specimen of *P. pistillaris* in the Peradeniya herbarium, from Mannar, collected by Trimen in February, 1890, and it has been recently collected at Trincomalee (No. 3230, September, 1910). It is reported to be common in the dry sandy districts after or during the rains of the north-east monsoon.

Tylostoma.

Tylostoma Mussooriense P. Henn. Thwaites 1008 was a Tylostoma, which Berkeley and Broome listed in Fungi of Ceylon, No. 711, as *Tulostoma exasperatum*. The specimens in Herb. Peradeniya have strongly verrucose spores, 4–5 μ diameter, and a circular, barely projecting mouth. They appear to be *T. Mussooriense*, not *T. exasperatum*.

This species has not been collected again in Ceylon.

Mitremyces.

Mitremyces insignis (Berk.). This species was described by Berkeley in Decades of Fungi, No. 185, as *Husseia insignis*. In the Fungi of Ceylon, No. 705, Berkeley and Broome enumerated three gatherings, viz., the type collection from Adam's Peak (Gardner); a second by Thwaites, Central Province, December, 1868; and a third by Thwaites, South of the Island, July, 1868. In the Introduction to the Fungi of Ceylon, Berkeley and Broome quote Thwaites to the effect that he had always found Husseia on the sandy margins of forest streams. Husseia is now considered to be identical with Mitremyces. Massee adopted the name Calostoma for Mitremyces.

There are two specimens in Herb. Peradeniya, marked "S. of the Island," collected by Thwaites. It has not been collected recently.

Mitremyces Berkeleyi (Mass.). In Fungi of Ceylon, No. 704, Berkeley and Broome enumerated a Mitremyces, collected by Thwaites, as *M. lutescens*. The gathering consisted of two specimens only, one of which is in Herb. Kew and the other in Herb. Peradeniya. Massee (Ann. Bot., II., p. 39) re-described the Kew specimen as *Calostoma Berkeleyi*, and stated that the spores were smaller than those of *M. Junghuhni* and less coarsely warted, and that the structure and colour of the exoperidium were different. Lloyd (Myco. Notes, No. 20, p. 241) writes that the specimen is *M. Junghuhni* as far as external characters go, but that he did not succeed in finding spores.

Massee gave the spores of *M. Junghuhni* as globose, coarsely tuberculose, pale ochre, 14–18 μ diameter, and those of his *Calostoma Berkeleyi* as globose, minutely verruculose, very pale ochre, 7–9 μ diameter. In the Peradeniya specimen the spores are hyaline, globose, 7–10 μ diameter, reticulated with narrow deep bands, which form a wide-meshed net, and appear at the profile of the spore as a hyaline border interrupted by yellow lines. The spores resemble those of *Trichia affinis*, but with narrower bands.

Geaster.

Geaster plicatus Berk. No. 4471, Peradeniya, December, 1914, No. 4593, Hakgala, May, 1913. This species was collected by Thwaites, No. 1007, and was recorded by Berkeley and Broome in Fungi of Ceylon, No. 706, as *G. Bryantii*. The figure which accompanied the gathering was labelled by Berkeley *Geaster Bryantii*, with the alternative name *Geaster Thwaitesii* B. & Br. A description under the latter name, by Massee, appeared in Saccardo, VII., p. 471. The figure is peculiar in showing a stout pedicel, 7 mm. diameter.

Geaster Bryantii Berk. A single specimen, No. 5573, collected at Horagama, in 1908, appears to be referable to this species. It has the general appearance of *G. plicatus*, but the exoperidium is more divided and more deflexed. The pedicel is stout, and the base of the endoperidium concave, so that the pedicel is socketed in the base. It lacks the radial grooves of *G. plicatus*. The wall of the endoperidium, at the margin of the concave disc, is vertical, scarcely grooved.

Geaster Archeri Berk. No. 2517, Peradeniya, October, 1907 : det. Lloyd. No. 2621, Peradeniya, July, 1908. No. 3323, Peradeniya, December 1911. Lloyd (Letter 19) states : "These specimens present a new character in *Geaster Archeri*. The endoperidium is scurfy, 'asperate'; indeed, if it had a pedicel it would be *Geaster asper*."

Geaster triplex Jungh. No. 2618, Peradeniya, August, 1908. No. 2654, Hakgala (jungle), September, 1908. No. 2655, Kotagala, September, 1908. No. 2957, Peradeniya, June, 1909. No. 3908, Hakgala, January, 1914. No. 3992, Peradeniya, December, 1913. No. 5572, Hakgala, December, 1917.

The following note on a Ceylon gathering made in 1906 was published by Lloyd in Mycological Notes, No. 26, p. 339 :—

"Among some Geasters recently received from the Botanical Garden, Peradeniya, Ceylon, were some small specimens of *Geaster triplex* with a scaly exoperidium

(Fig. 166). We have seen many specimens of *Geaster triplex*, for it is a frequent plant in many countries, but we never previously saw specimens with a scaly exoperidium. If this form is constant in Ceylon it is entitled to a name (*Geaster squamosus*) as a form, and it is fully as distinct as *Geaster vittatus* based on longitudinal fissures in the exoperidium of the same species. While the character of a scaly exoperidium is absolutely new in the Geaster family, to call it a ' new species ' would appear to me to be untrue. Any one who is familiar with *Geaster triplex* would consider it as a mere form."

The above form has not been noted since. The gathering consisted of two specimens only, as figured in Lloyd's photograph.

Geaster mirabilis Mont. No. 2142, Peradeniya, July, 1906; det. Lloyd. No. 2130, Peradeniya, November, 1906. No. 2619, Peradeniya, August, 1908.

This species was correctly recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 709, from Thwaites 184. There is also an undated collection from Ceylon in Herb. Kew in the cover of *G. papyraceus*.

Common; growing in large patches over heaps of leaves, twigs, &c.

Geaster minimus Schw. No. 4594, Hakgala, October, 1914. These specimens grew from a thick felt of mycelium on the top of a rock.

G. minimus Schw. was recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 708. The specimens in Herb. Kew and Herb. Peradeniya are Thwaites 1009, and are small specimens of *G. velutinus*.

Geaster coronatus Schaeff. No. 2323, Hakgala, April, 1907; det. Lloyd. Lloyd, in referring this gathering, states: " A most curious form, that could well be made a new species, and certainly entitled to a name as a form of coronatus. The inner peridium has at its base a ring somewhat like the ring on *Geaster Bryantii*, which never occurs on the European plant."

Geaster velutinus Morgan. No. 2931, Peradeniya, September, 1909. No. 3388, Peradeniya, January, 1912. No. 3972, Hakgala, April, 1914. No. 5572, Hakgala, December, 1917; in this gathering some specimens do not exceed 1·5 cm. in diameter when expanded, and unexpanded specimens are distinctly flask-shaped.

Bovista velutina B. & Br., described in Fungi of Ceylon, No. 715, from Thwaites 195, is unexpanded *Geaster velutinus* in Herb. Peradeniya; and the specimens recorded by Berkeley and Broome as *G. minimus* Sch., from Thwaites 1009, are the same species. Lloyd (Myco. Notes, 17, p. 182) refers to the type of *Bovista velutina* at Kew as an unopened Geaster.

Geaster saccatus Fries. No. 2141, Peradeniya, July, 1906; det. Lloyd. No. 2620, Peradeniya, July, 1908. No. 2622, Peradeniya, August, 1908. Warriapolla, January, 1918.

This species was correctly recorded by Berkeley and Broome in Fungi of Ceylon, No. 707, from Thwaites 184. The specimens are, in part, *G. saccatus* in Herb. Peradeniya, but the collection included *G. mirabilis*, and, apparently, *G. velutinus* also.

Lanopila.

Lanopila bicolor (Lév.). This was recorded by Berkeley and Broome as *Bovista bicolor* in Fungi of Ceylon, No. 713, from Thwaites 727. There are specimens of this gathering in Herb. Kew and Herb. Peradeniya, and Lloyd (Myco. Notes, 18, p. 190) states that specimens from Ceylon are to be found in European museums. It has not been collected recently, and is apparently rare at Peradeniya.

Lasiosphæra.

Lasiosphæra Fenzlii Reichardt. The specimen recorded as *Bovista lilacina* by Berkeley and Broome in Fungi of Ceylon, No. 712, from Thwaites 1010, is *Lasiosphæra Fenzlii* in Herb. Peradeniya. The Peradeniya specimen is a section of a subturbinate example, 8 cm. high, with a sterile base 3·5 cm. high. It is not fully mature, and the spore mass is paler than in the ripe form, but it has the usual capillitium and spores, the former nearly hyaline and the latter yellow-brown.

This species is apparently not common at Peradeniya. It was collected about 1903 by Mr. H. F. Macmillan and sent to Lloyd (Puff Ball Letter 1, p. 1). It was again collected at Peradeniya in October, 1907 (No. 2518), and at Hambantota (dry zone) in April, 1908 (No. 2542). No. 2518 is subglobose, has a slight sterile base, and violet-purple gleba ; No. 2542 is turbinate, with a well-developed sterile base, and being immature, the gleba is pale purplish-brown.

The fungus is at first white and even. As it approaches maturity it shrinks slightly, and the peridium contracts in a series of close-set depressions, each about 1 cm. in diameter. The white outer layer disappears from the ridges and exposes the chocolate-coloured inner layer, so that the peridium becomes tessellated. This feature is clearly marked in both the recent specimens, but a larger series may show that it is not universal.

Calvatia.

Calvatia Gardneri (Berk.). Collected by Gardner (No. 9, May, 1844) and first assigned by Berkeley to *Lycoperdon saccatum* (Decades of Fungi, inter 184 et 186). Collected by Thwaites, 739 cum icone, and described as *Lycoperdon Gardneri* in Fungi of Ceylon, No. 716. Lloyd, Puff Ball Letter 2, p. 2, acknowledges specimens from Peradeniya as *Calvatia Gardneri*.

Common at Peradeniya and attains a large size. The largest specimen measured was 17 cm. high, 22 cm. across the longer diameter, and 14 cm. along the shorter. I have been given the Tamil name *Vannan Pothei Kalan*, "Dhoby fungus," for this species, and my informant suggested that it owed its name to a supposed resemblance to dirty soap suds.

Calvatia Gautieroides B. & Br. Described by Berkeley and Broome in Fungi of Ceylon, No. 718, as Lycoperdon, from Thwaites 1006 cum icone ; the specimens were said to grow on burnt earth, and were collected in the Central Province.

Two recent collections have been made, No. 3241, Peradeniya, October, 1910, and No. 5804, October, 1918. The specimens grew from white, cord-like mycelium overrunning

dead twigs. They are ovoid or turbinate, often laterally compressed, up to 5 cm. broad, 3 cm. high, with a short, obconic stalk ; usually irregularly lobed, sometimes umbilicate round the stalk, white or pale yellow, becoming ochraceous, minutely scurfy or granular ; wall thin, sterile base well developed. Capillitium threads yellow-brown, somewhat rigid, 3 μ diameter, fairly regular. Spores oval, 3–5 × 2·5–4 μ, or globose, 3 μ diameter, pale yellow-brown, echinulate, pale olive in mass. When mature, the wall is fragile and breaks away in small fragments.

Bovista.

Of the three species of Bovista recorded by Berkeley and Broome in the Fungi of Ceylon, one, *Bovista bicolor* Lév., is now known as *Lanopila bicolor ;* and another, *Bovista lilacina*, is *Lasiosphæra Fenzlii ;* the third, *Bovista cervina*, is apparently an undescribed species.

Bovista cervina Berk. was described from specimens brought by Darwin from South America. A few years later Berkeley enumerated the same species from Ceylon among a collection sent by Gardner (Gardner No. 17). Massee (Revision of the Genus Bovista, Journal of Botany, 1888, p. 184) stated that *Bovista cervina* occurred in Patagonia, Chili, Ceylon, and New Zealand, and was identical with *Bovista aspera* Lév., "as proved by examination of the type specimen in Herb. Mus. Paris." He described the capillitium as flaccid, unbranched, pale, and the spores globose, smooth, very pale brown, minutely pedicellate, 5–6 μ diameter, but his figures of the spores show pedicels one and a half times the length of the spore.

In Mycological Notes, No. 25, p. 324, Lloyd writes concerning *Catastoma subterraneum :* "It was brought from Patagonia by Darwin, and called by Berkeley *Bovista cervina*." This fixes Berkeley's type specimen, but the Ceylon species is not a Catastoma.

The specimens of Gardner No. 17 in Herb. Kew are globose, not more than 3 cm. diameter, with white cord-like mycelium. The cortex persists in the form of minute, scattered, flat, adpressed, fibrillose patches. The capillitium is pale

brownish-yellow, septate, branched, varying from 3 to 10 μ in diameter. The spores are pale brownish-yellow, or yellow, globose, minutely warted, 3·5 to 4 μ diameter, and not pedicellate.

In 1907 a gathering was made at Peradeniya of a species which was supposed to be *Bovistella citrina*. Lloyd, in acknowledging specimens of this gathering in letter No. 19, wrote: "*Lycoperdon cervinum*, in the sense of Berkeley's Ceylon determination, not of his South American, which is not a Lycoperdon." The gathering (No. 2515) had unfortunately proved to be a mixture, and the only specimens of *Bovista cervina* had been sent, the remainder of the gathering in Herb. Peradeniya being all *Bovistella citrina*. The incident may serve to illustrate the similarity in general appearance between the two species.

In a recent collection, No. 5803 in Herb. Peradeniya, which is immature, the specimens are globose, or depressed globose, up to 4 cm. diameter, fawn-coloured, or brownish-fawn, above, passing into brownish-yellow at the sides. The cortex is about 0·5 mm. thick, fleshy and yellow internally, and covered with a layer of interwoven, adpressed fibrils, which sometimes splits into small, polygonal, flat warts or scales. A stout, rooting mycelial cord runs from the centre of the rounded base. When wet it may easily be passed over as *Bovistella citrina*, as happened in the gathering No. 2515. I leave this species under Berkeley's name, as that is otherwise unoccupied.

Bovistella.

Bovistella aspera Lév. On bare ground in flower beds and on patana (grass land), Hakgala, common. No. 2322 (in part), April, 1907; No. 2377, April, 1907 (det. Lloyd); No. 2644, September, 1908; Nos. 4155, 4156, September, 1914; No. 4572, May, 1912; No. 5568, December, 1917.

Bovistella scabra Lloyd. With the preceding, but less common. No. 2322 (in part), April, 1907 (det. Lloyd); No. 5569, December, 1917; No. 5571, April, 1917, all from Hakgala. This appears to run into the preceding species in Ceylon.

Bovistella citrina (B. & Br.) Lloyd. Described by Berkeley and Broome in Fungi of Ceylon, No. 724, as *Lycoperdon citrinum*, from Thwaites 738 cum icone. Recently collected No. 2414, Peradeniya, June, 1907 ; No. 2515, Peradeniya, October, 1907 ; No. 2645, Hakgala, September, 1908.

Up to 4 cm. diameter, globose, or depressed globose, sometimes lacunose below, lemon-yellow, pale towards the base, with a delicate cortex of minute white spines ; usually arising from stout cord-like mycelium. Old specimens dark red-brown when moist, drying to dark shining olive, covered with minute, deep red-brown, or almost black, warts. No sterile base. Mass of spores and capillitium olive. Capillitium threads yellow-brown, stout, thick-walled, 3–10 μ diameter, branching usually at a wide angle, with occasional septa above the forks. Spores globose, 3–4 μ diameter, pale olive, very minutely echinulate, with hyaline pedicels up to 16 μ long.

When growing, this species appears entirely lemon-yellow, but a close examination reveals a very delicate cortex of minute white spines or warts. On some specimens this cortex may disappear at maturity ; in others it persists and dries in the form of minute warts. The yellow wall is 0·5 mm. thick on the immature specimens, but it becomes thin and papery when mature.

Bovistella conspurcata (B. & Br.). Described as *Lycoperdon conspurcatum* by Berkeley and Broome in Fungi of Ceylon, No. 723, from Thwaites 193 bis. The type in Herb. Kew is marked by Thwaites, " mixed with 193, I believe, in a previous gathering." There are only two specimens. No. 193 was *L. purpurascens ;* there is no mixture in the specimens of 193 in Herb. Peradeniya.

Berkeley and Broome's description is " globose, peridium minutely verrucose, here and there cracked, base small, shortly rooting ; capillitium and spores olivaceous ; spores pedicellate, 3·75 μ diameter, 12·5 μ long (including the pedicel). Scarcely an inch across. Externally resembling *L. australe*, but with differently coloured spores, which are stipitate."

The cortex is cracked into red-brown polygonal areas, some of which are powdery with minute warts. The capillitium consists of rigid, branched, yellow-brown threads 3–5 μ. diameter. The spores are globose, yellow-brown, smooth, 3 μ. diameter, with slender pedicels, 4–10 μ. long. This species has not been collected again. Its cortex characters can be matched exactly in some of the Ceylon specimens of *Lycoperdon piriforme*, but though the latter has pedicels mixed with the spores, I have not found any specimen in which the pedicel remains attached to the spore.

Lycoperdon.

Lycoperdon gemmatum Batsch. Thwaites's specimens, No. 192, referred by Berkeley and Broome to *Lycoperdon atropurpureum* Vitt., var., in Fungi of Ceylon, No. 717, are *Lycoperdon gemmatum*. The specimens in Herb. Peradeniya are labelled "Peradeniya." It is rare at Peradeniya, but common at Hakgala and Nuwara Eliya (5,600–6,200 feet). No. 2139, Hakgala, September, 1906; det. Lloyd. No. 2371. Namunakuli, April, 1907. No. 2411, Peradeniya, June, 1907. No. 2653, Nuwara Eliya, September, 1908. No. 4571. Hakgala, May, 1912. No. 5570, Hakgala, December, 1917.

Lycoperdon piriforme Schæff. On rotting stumps, Hakgala. No. 2651, September, 1908. No. 4157, April, 1914. Nos. 5575, 5576, December, 1917. Ceylon specimens are more globose than the European form, and examples with well-developed stalks are rare.

Lycoperdon rubecula B. & Br. Described by Berkeley and Broome in Fungi of Ceylon, No. 720, from Thwaites 311 cum icone, collected at Peradeniya. Recent collections are Nos. 2412, 2413, 2415, Peradeniya, June, 1907, det. Lloyd; No. 2455, Peradeniya, June, 1907; No. 2516, Peradeniya, October, 1907; Nos. 2646, 2647, Hakgala, September, 1908; No. 2138, Pattipola, October, 1906.

Generally clustered, turbinate, or pyriform, or globose, up to 4 cm. high, 3 cm. diameter, usually stalked, white or yellowish, covered with minute spines, sometimes clustered and converging, which become red-brown at the tip. Sterile

base of large cells usually well developed, limited above by a stout diaphragm. Cortex subpersistent. Capillitium of coarse, rough, hyaline threads up to 12 μ diameter. Spores globose or subpyriform, apiculate, very minutely warted, 3–4 μ diameter. On the ground, sometimes among grass.

The specimens from Hakgala are more globose, and the sterile base is much reduced. The cortex in these specimens shows a tendency to fall off in flakes, and the red-brown colouration is not confined to the tips of the spines, but extends over the upper two-thirds of the peridium.

Lycoperdon Wrightii Berk. No. 2650, Hakgala, September, 1908. These specimens grew on a dead tree trunk. Also on a jak tree, Peradeniya, No. 4417, January, 1915; No. 5577, May, 1916.

This identification is uncertain. The specimens have the cortex of *L. Wrightii*, but the capillitium characters do not quite agree, and they invariably grow on tree trunks up to a height of 4 feet or so from the ground.

In No. 2650 the specimens are globose, about 1 cm. diameter. In one the capillitium is thick, hyaline, and septate, but in an old weathered specimen the capillitium which remains, though septate and somewhat flaccid, is fusco-olivaceous, 4–7 μ diameter. The specimens from Peradeniya are from a living jak tree, on which it has appeared periodically for the last three years, but never more than one or two at a time. They are narrow-oval, or clavate, sessile, up to 8 mm. high, and 5 mm. diameter. There is no sterile base, and the capillitium is very scanty. In the available ripe specimens the capillitium appears to have been damaged by insects, and consists of short fragments, pale olive, unbranched, septate, regular, 4 μ diameter.

The material at present available is scanty, and more is required before any definite decision is possible.

Lycoperdon purpurascens Berk. Thwaites 193, referred to *Lycoperdon pusillum* Bull., in Fungi of Ceylon, No. 725, is *L. purpurascens* in Herb. Peradeniya. Recent collections

are No. 2140, Pattipola, October, 1906 (det. Lloyd); No. 2140a, Hakgala, September, 1908; No. 2485, Peradeniya, August, 1907; No. 2983, Peradeniya, July, 1909; No. 5574, Warriapolla, January, 1918.

This species grows on rotten wood, which is permeated by rather fine cords of white mycelium. Bluish-purple when fresh, becoming paler towards the base, sometimes almost black above, covered with minute scattered black warts or short spines, especially in the upper part; when dry often marked with close-set pits and appearing reticulated. Globose, sessile, up to 2 cm. diameter, usually clustered. Mass of capillitium and spores pale purple-brown; capillitium hyaline, irregular, scanty; spores globose, with scattered warts, 3–4 μ diameter. No sterile base.

Lycoperdon phlebophorum B. & Br. Described by Berkeley and Broome in Fungi of Ceylon, No. 719, from Thwaites 194 in part. It was said to be "extus venoso-reticulatum." Berkeley and Broome stated that the spores were not yet perfect.

The type in Herb. Kew consists of two specimens, only one of which has a reticulated wall. They appear to be young specimens of *L. Gautieroides*, and this opinion is shared by Lloyd (in litt.). Massee stated (Mon. Genus Lycoperdon) that there were minute mealy warts between the reticulations, and that the spores were broadly elliptical, 5 × 3–4 μ, both of which points would fit in with *L. Gautieroides*.

Lycoperdon cepæforme Bull. No. 2321, Peradeniya, April, 1907, on bare soil in flower beds; det. Lloyd. "Very close to the European plant, but differs in its larger mouth and general aspect and habits. The essential points (cortex, capillitium, and spores) are the same" (Lloyd).

Lycoperdon echinatum P. var. **echinellum** B. & Br. Berkeley and Broome described this variety in Fungi of Ceylon, No. 721, citing Thwaites 194. In Fungi of Ceylon, No. 722, they described *Lycoperdon echinulatum* B. & Br., without any Thwaites's number. Massee (Mon. Genus Lycoperdon) did not refer to Berkeley and Broome's variety under *L.*

echinatum Pers. (p. 704), but on page 711 he listed *L. echinulatum* B. & Br., Fungi of Ceylon, No. 722, and wrote at the end of the description " (= *L. echinellum* B. & Br. in Herb. Berk.)."

I was unable to find Berkeley's specimen of *L. echinulatum* B. & Br. in Herb. Kew. Nor does there appear to be any specimen " *L. echinellum* " in Herb. Berk. Berkeley's labels are " *Lyc. echinatum* var. *echinellum*," and the specimens are consequently Fungi of Ceylon, No. 721. The type of *L. echinulatum* is apparently missing from Herb. Kew. Massee's description of *L. echinulatum* is chiefly a translation of Berkeley and Broome's. I take the specimens, Thwaites 194, in Herb. Kew and Herb. Peradeniya to be Berkeley and Broome's var. *echinellum*. It is not related to *L. echinatum*, and may stand as a species, *L. echinellum* B. & Br. The specimens in Thwaites 194 are turbinate, almost sessile, or with long stalks, from 1·5 cm. high, and the same diameter, to 3 cm. high, 1·2 cm. diameter above. In a recent collection, No. 2137, Peradeniya, October, 1906, they are more regular, ovoid or turbinate, shortly stalked, up to 3 × 2 cm., and 2·5 cm. high, red-brown, with a cortex of rather long and acute red-brown spines, often connivent in conical groups. The cortex is deciduous, separating in large patches, and leaving the surface tomentose. In young specimens the gleba is yellow, but becomes yellowish-olive when old. The sterile base is small, and woolly rather than cellular, limited by a distinct diaphragm. The capillitium threads are yellow-brown, regular, sometimes closely flexuose, firm-walled, septate, 3–4 μ diameter. The spores are globose, yellow-brown, minutely spinulose, 3–4 μ diameter. The recent collection grew on a rubbish heap, arising from white cords of mycelium.

It would appear that Massee examined Thwaites 194 for his description of *L. echinulatum*, as he describes the sterile base as dense and indistinctly cellular.

Lycoperdon fucatum Lév. was recorded for Ceylon by Berkeley in his enumeration of the species collected by Gardner, and *Lycoperdon rugosum* B. & C. was given for Ceylon in Cuban Fungi, No. 504, but neither of these records was included

by Berkeley and Broome in their Fungi of Ceylon. The specimens have not been critically examined. Massee, in his Monograph of the Genus Lycoperdon, cites Ceylon for both these species, but as his localities were in the majority of cases evidently taken from the herbarium sheets without examination of the specimens, his statements cannot be relied on.

Lycoperdopsis.

Lycoperdopsis arcyrioides P. Henn. No. 2374, Peradeniya, November, 1907.

SCLERODERMACEÆ.

Scleroderma.

Scleroderma columnare B. & Br. Described by Berkeley and Broome in Fungi of Ceylon, No. 726, from Thwaites 674, cum icone. A fairly frequent species at Peradeniya, among grass under trees.

Total height up to 4 cm. Head globose or laterally oval, usually about 2·5 cm. diameter, sometimes up to 4 cm., purple-brown or reddish-brown, even, appearing glabrous when moist, but minutely tomentose when dry, outer layer cracking into minute areolæ. Stalk up to 1·5 cm. high, 9 mm. diameter, white or yellowish, slightly tomentose, usually regular and terete, expanding gradually or abruptly into the head. In section the stalk shows a cartilaginous layer immediately beneath the epidermis, which layer is continued over the apex of the stalk, usually convexly, and separates the gleba from the stalk tissues. The central stalk tissue is white and pith-like. When cut, the central portion of the stalk turns purple and the outer layer yellow. Gleba mass purple-brown. Spores brown, globose, 8–12 μ diameter, with close-set spines, 2–3 μ long. The stalk arises from a copious mass of mycelium. The head splits up irregularly when ripe.

Scleroderma endoxanthum n. sp. Epigeal, sessile. Irregularly depresso-globose, vertically sulcate, up to 10 cm. diameter, blackish-olive, even, the surface broken into minute areolæ. Basal mycelium scanty, sulphur-yellow. Cortex up to 3 mm. thick, bright orange-yellow throughout;

gleba purple-black. Spores purple-brown, spherical, 6–8 μ diameter, furnished with long acute spines, and reticulated with narrow, often broken, bands. Dehiscence not observed. No. 5237, Peradeniya, May, 1917.

Henning's *Sclerotium vulgare* var. *novoguineense* would appear, from the description, to be close to this.

Scleroderma pseudostipitatum n. sp. Epigeal. Ellipsoid, or globose, up to 5 cm. diameter, pale ochraceous, sometimes purplish when young, even, at first smooth, glabrous, the outer layer subsequently splitting into minute innate scales. Usually stalked, the stalk up to 3 cm. high, irregular, lacunose, often compressed, sometimes an irregular mass of the same diameter as the head, arising from white masses of mycelium, occasionally wanting. Cortex internally white, becoming reddish when cut. Mass of spores olivaceous. Spores brown, globose, 8–10 μ diameter, verrucose with coarse warts, which are sometimes united in lines forming a broken reticulation. Hakgala, abundant.

In one gathering, No. 2958, September, 1908, the spores in some specimens have the warts produced into long spines, united by a regular reticulation; these spores measure 12–15 μ. In other respects the specimens do not differ from the type.

When mature, dehiscence occurs at the apex, the fungus becoming a deep, stalked cup, filled with a powdery mass of spores.

Hymenogastraceæ.

Lycogalopsis.

Lycogalopsis zeylanica n. sp. Sessile, globose or ellipsoid, 7–10 mm. diameter, usually clustered, often angled by mutual pressure, on or partly embedded in a white, tomentose, compact basal layer. At first white, with a thin, white, pruinose or tomentose outer coat, which sometimes splits into areolæ and usually disappears, leaving the peridium buff, or pale ochraceous, or grayish-white, glabrous, shining. Peridium thin, testaceous, splitting irregularly. Capillitium profuse, of diverging, pale ochraceous, or almost white, threads, extending from the base to the peridium; threads

4–6 μ diameter, rough, often united into strands. Spores globose, 3–4 μ diameter, or oval, 4 × 3 μ, pale ochraceous in mass, hyaline, coarsely warted or spinulose.

Peradeniya, August, 1906 ; November, 1906 ; November, 1917.

Hydnangium.

Hydnangium carneum Wallr. var. **purpureum.** Hakgala, December, 1917. Subglobose or ellipsoid, white below, pinkish or pale purple-red or pale purple-brown above, often vertically streaked. Gleba flesh-coloured ; spores very pale yellow, almost hyaline, spherical, 10–15 μ diameter, thickly covered with close-set conical spines, 1·5 μ long.

Rhizopogon.

Rhizopogon flavum Petch. Hakgala, January, 1914 ; December, 1917. Further specimens show that this species attains a length of 5 cm. with a breadth and height of 3 cm.

Hymenogaster.

Hymenogaster zeylanicus Petch. Hakgala, May, 1913 ; December, 1917. Sita Eliya, December, 1917.

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EDITED BY

T. PETCH, B.A., B.Sc.

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Saccolabium longifolium and Saccolabium Wightianum.

BY

T. PETCH, B.A., B.Sc.

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AMONG the species of *Saccolabium* recorded for Ceylon are *S. longifolium* Hk. f. and *S. Wightianum* Hk. f.

Saccolabium longifolium was said by Hooker (Flora Ceylon, IV., 198) to have a flower entirely yellow, barred with red on both surfaces, except the lip, which has a few red dots at the apex. Its leaves are lorate, 15–30 cm. long, and 3·75 cm. broad, and its panicle is 15–20 cm. long, with a long, stout peduncle. Its record for Ceylon rests on C. P. 3492; and Hooker quoted a note by Trimen to the effect that the Ceylon plant in the Peradeniya Gardens exactly resembled Lindley's figure, which was taken from a Chinese specimen that flowered in England. The colours given by Hooker appear to be taken from the Ceylon painting.

Saccolabium longifolium Hk. f. is *Acampe multiflora* Lind., Fol. Orchid. 1, and *Acampe longifolia* Lind., *loc. cit.* Lindley stated that the former, which is the Chinese species, had a yellow lip, and the spur inappendiculate; while the latter, from Burma, had a white lip, and a hairy plate within the spur; but Hooker (*loc. cit.*) stated that in all the specimens he had examined (including Lindley's) there was a hairy plate within the sac descending from the mouth on the opposite side from the column. King and Pantling, in "Orchids of the Sikkim-Himalaya," plate 292, figure *S. longifolium* with a white lip.

Saccolabium Wightianum Hk. f., according to Hooker in Fl. Ceylon, has its sepals and petals pale yellow, sparingly barred or spotted with red, and a white lip with a few transverse red stripes. Its leaves are ligulate, 10–15 cm. long and 3 cm. broad, and the panicle only 2·5–5 cm. long. According to Wight (Icones, t. 1670) the flowers are yellowish dashed with

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dark crimson or purplish spots, and the lip nearly white, with a red line at the base of the lamina. In Fl. Brit. India the sac is said to be papillose within, but that detail is omitted in Fl. Ceylon. No mention is made of any plate within the sac.

Hooker suggested that *Saccolabium Wightianum* was possibly not distinct from *S. longifolium*. The distinguishing characters given in the key to the genus *Saccolabium* in Flora Ceylon are " *S. longifolium*, lip yellow," and " *S. Wightianum*, lip white."

Saccolabium Wightianum.

Saccolabium Wightianum was C. P. 2342. The figure shows leaves 16·5–18 cm. long, of uniform breadth (2 cm.), the apex deeply cut into two unequal lobes, and flowers with a white lip. It is said to be rare in Fl. Ceylon, and is recorded only from Jaffna and Hantane. There are only two sheets in Herb. Peradeniya, and some of the leaves on one are only 11 cm. in length, with tips barely incised.

This species is not uncommon at Peradeniya (which lies just below the Hantane range). On the fresh plants the leaves are equal, 11–18 cm. long and 1·5–2·5 cm. broad. The tips are usually deeply incised, but the lobes vary in length, and are equal or unequal on the same plant. The flower is about 1 cm. in diameter. The sepals and petals are yellow, or greenish-yellow, barred and spotted with red. On the sepals the red colouration is usually in dots, arranged more or less in transverse lines ; the petals are more definitely barred. The lip at first is white, with purple transverse bars and sometimes a few dots, in varying numbers. In some cases the lip bears five bars, either complete from side to side, or extending only halfway across, together with two or three scattered dots ; in others the purple colour may be confined to a single dot near the tip. But as the flower ages the lip becomes yellow, and the bars and spots red. At the same time the sepals and petals become more erect, and the transverse barring on them appears more prominent. The lip, under a magnification of eight diameters, appears minutely tuberculate. At its base there is a small group of larger tubercles, and, following this in the mouth of the sac, a triangular, erect, hairy tooth, which

is continued down the sac as a yellow, hairy, slightly elevated ridge. The edge of the lip is irregularly incised or fimbriate. The side lobes of the lip are strongly hairy on their inner surface, and are usually barred with purple on the inner surface, but not on the outer. The apex of the spur is yellow from the first. The inflorescence is crowded on a stout peduncle about 2 cm. long. It has a strong odour of vanilla.

Wight's figure of *S. Wightianum* (Icones, t. 1670) appears to show a tomentose lip, which, as noted by Lindley, bears two transverse subulate processes near the base. It is probable that these are errors of reproduction, the apparent processes being the transverse purple bars, and the tomentose appearance an attempt to represent the tubercular surface of the lip.

For some time I have had *Saccolabium Wightianum* under observation at Peradeniya. In three successive years it has flowered in May-June, not in September, as given in Flora Ceylon. The inflorescence lasts for a long time, one of six or nine flowers persisting for four weeks. The lips begin to turn yellow from the third to the fifth day, but I have never seen an inflorescence which had the lips of all the flowers yellow at the same time. As a rule, the lower flowers have decayed, before the lip of the uppermost has changed colour. For example, two inflorescences, one of nine and the other of six flowers, began to flower on May 27, 1917. On June 4 there were four flowers with white lips in the former and one in the latter, the remaining five in each case being yellow. On June 16 there was still one white-lipped flower in each inflorescence, but the outer flowers had begun to decay. On the same date, May 27, an inflorescence of ten flowers had seven with yellow lips and three with white lips ; the last flower changed colour on June 9, but there were then only three flowers left, the remainder having decayed.

Saccolabium longifolium.

The figure of *Saccolabium longifolium*, C. P. 3492, in Herb. Peradeniya, shows leaves 16–17 cm. long, 3·5 cm. broad, somewhat narrowed towards the tip. The tip is deeply incised, but the lobes are practically equal. On the herbarium specimen

the leaves are 20–26 cm. long, and 2·8–3·3 cm. broad, with the tips barely incised. The peduncle is much longer than that of *S. Wightianum*, and the flowers more scattered ; the whole inflorescence on the herbarium specimen is 20 cm. long, with scattered branches from the base upwards, but the one figured is only 15 cm. long, unbranched, with flowers only near the apex. In the inflorescence figured only two lips are evident, and these are yellow ; a flower drawn separately has also a yellow lip with four minute red dots at the tip.

The herbarium specimens of *S. longifolium* were collected by Thwaites in 1865 at Kitulgala. I have recently received living plants of the same species from that locality and from Bibile, collected by Mr. H. F. Tomalin, Conservator of Forests.

The first point which strikes one on seeing living examples of these two species is the marked difference in habit. *Saccolabium Wightianum* forms a tangled mass, its stems hanging down and curving upwards at the extremity ; while *S. longifolium* produces erect stems up to 30 cm. high.

The second point of difference is the length of the inflorescence. In *S. Wightianum* the inflorescence is short, not more than 5 cm. high, and forms a compact head of flowers ; while in *S. longifolium* it is up to 25 cm. high, with scattered branches.

The length of the leaf is variable, and on some plants of *S. longifolium* the leaves do not exceed 15 cm. in length. They are, however, as a rule, broader than in *S. Wightianum*, and the breadth diminishes slightly towards the tip. But the leaf characters are scarcely sufficient to separate the two species.

The flower of *S. longifolium* is usually larger than that of *S. Wightianum*, and may attain a diameter of 18 mm. It is more clearly yellow, not greenish-yellow, but the differences in colour between the two species are slight. The barring and spotting of the sepals, petals, and lip are the same in both, and in both species the lip is at first white and subsequently becomes yellow. The side lobes of the lip are hairy on the inner surface, and there is a small vertical hairy plate or tooth in the mouth of the sac, which is smaller than the corresponding plate in *S. Wightianum*. The base of the spur is yellow from the first.

The only marked difference in colour is on the area surrounding the disc. In *S. longifolium* the disc is bordered by a broad, vivid purple-red zone, and the horns at either corner of the column are red. In *S. Wightianum* there is a narrow red zone at the base of the column, but the edge of the disc is yellow, and the horns at the top of the column are also yellow.

The outstanding difference between the two flowers lies in the upper surface of the lip. In *S. Wightianum* this is tuberculate, but in *S. longifolium* it is tomentose.

The distinguishing differences between the two species, as known in Ceylon, are, therefore, the relative lengths of the inflorescence and the structure of the lip.

S. longifolium has an odour resembling that of the Lily of the Valley.

Hypocreaceæ Zeylanicæ.

BY

T. PETCH, B.A., B.Sc.

IN the Fungi of Ceylon Berkeley and Broome enumerated 54 species of *Hypocreaceæ*. Cesati added 5 species from Beccari's collection, and Cooke described several Ceylon species which he found in Berkeley's herbarium. Some of Berkeley and Broome's species of *Nectria* have been re-described by von Höhnel, who has added new species which were overlooked or misnamed by them, but in general the Ceylon specimens of this family have not been critically re-examined. The present contribution deals more especially with the old Thwaites's specimens, no special collecting in this group having been done. The total number of recorded species is consequently comparatively small, and further collecting may be expected to add to it considerably.

Saccardo's subdivisions of the genus *Nectria* have been adopted, in the absence of any more satisfactory scheme of classification. The division of the genus into stromatic and non-stromatic forms would appear to be inapplicable in the case of tropical species. *Nectria bicolor*, for example, has typically a well-developed stroma, but in some gatherings the perithecia are scattered, without any stroma; and *Nectria flavolanata* may be stromatic or not in the same gathering. It may be noted that conidial stromata, of the type of that of *Nectria cinnabarina*, seem to be rare in Ceylon; in the cases in which the conidial stage is known it is mucedinous, an effused weft of hyphæ and conidiophores. This, again, precludes the adoption of a classification based on the character referred to above, if the term "stroma" is extended to cover any basal weft of hyphæ, for such a stroma may be present or not according to the substratum on which the

fungus is growing. *Nectria hæmatococea*, for example, has no stroma when growing on wood or bark, as a rule ; but when it grows on a cacao pod, it frequently first covers the latter with a layer of mycelium and conidiophores, and the perithecia which subsequently develop would, under the terms postulated, be regarded as stromatic.

Saccardo's subdivisions are, however, unsatisfactory, in that they are not mutually exclusive. A *Nectria* which, according to the structure of its perithecial wall, is *Lepidonectria*, may be seated on a byssoid subiculum, and consequently be *Hyphonectria*. Cooke appears to have had this idea in mind in his classification of the genus *Nectria* in Grevillea, XII., and his subsequent employment of a double generic name, *e.g.*, *Dialonectria* (*Nectriella*) *gigaspora* (Grevillea, XVII., p. 42).

The genus *Ophionectria* Sacc. (=*Tubeufia* Penz. & Sacc.) has been divided by Seaver into *Ophionectria*, containing those species lacking a stroma, and a new genus, *Scoleconectria*, containing those species provided with a stroma. Two species of *Ophionectria* are known to occur in Ceylon, *O. trichospora* B. & Br., and *Ophionectria coccicola* Ell. & Ev. The former is the type species of the genus *Ophionectria*, while the latter is included by Seaver in *Scoleconectria*. The stroma of *Ophionectria coccicola* is a thin byssoid layer, slightly elevated where it grows over a scale insect, but frequently quite plane. *Ophionectria trichospora*, however, has also a thin byssoid stroma, though, as it is not parasitic on scale insects, the stroma is nowhere elevated. Seaver's generic distinction consequently fails.

Throughout the *Hypocreaceæ* Thwaites's specimens were mixed up in a most unaccountable manner. A conceivable solution is that it was the work of a native collector, who put together everything he gathered in a given locality. Thwaites apparently effected a partial separation, but the numbers were still mixtures when they reached Berkeley and Broome, and, in many instances, the type specimens are mixtures still. Therefore, it is necessary to exercise more than ordinary caution in examining these type specimens, for any one of them may contain as many as five species.

It has proved very difficult to discriminate between Berkeley and Broome's Ceylon species of *Hypocrea*, even with the assistance of fresh specimens. Indeed, this genus has given more trouble than any other of the Ceylon fungi whose revision has hitherto been attempted. The colour of the part-spores provides an excellent primary character, but very many of the specimens are so immature that no spores are present, and where hyaline spores are present in the ascus, it is not possible to be certain that that is their final colour, as the development of colour is usually of late occurrence. Comparison with fresh specimens is rendered difficult by the changes which these species undergo when drying or in the herbarium. Colour, of course, usually fades, or changes to a uniform red-brown, while one character which can be relied upon when the specimens are fresh, viz., whether the stroma is opaque or subtranslucent, has no definite parallel in the dried specimens. Some subtranslucent species dry to a horny consistency when immature, but become opaque and fleshy, or even friable, if dried in the mature stage, and the texture of the stroma appears quite different in the two stages. The characters which appear to be the most reliable are (1) the manner of attachment of the stroma, whether over the whole base or only centrally; (2) the position of the perithecia, whether at the same or different depths, and the position of the perithecial layer in the stroma; and (3) the shape of the perithecia, which, though not, as a rule, constant, varies in a definite direction, viz., from globose to laterally oval, or from globose to vertically oval.

The genera *Cordyceps* and *Torrubiella* have been omitted from the present list.

Epichloe pulvinulus B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 981. It was transferred to *Hypocrella* in Saccardo, Syll. Fungorum, II., p. 581. In Ann. Perad., VI., p. 172, it was re-described as *Balansiella pulvinula* (B. & Br.) Petch.

Epichloe cinerea B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 982. In Ann. Myc., IX., p. 394, a fungus from India was described under the same name by Sydow and Butler. It would, however, appear doubtful whether the Indian species is the same as the Ceylon one ; on the available specimens the Ceylon fungus would be referred to *Dothichloe*, but until fresh specimens are available, the question is best left undecided (see Ann. Perad., VI., p. 173).

Hypocrea artocreas B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 983, as " Hemisphærica, late affixa, subtus tomentosa albida, supra plana jecorina rugosiuscula, primum pulverulenta. Apparently on petioles of some palms. Sporidia not mature." Thwaites's number was 110, but in Herb. Peradeniya he mounted his specimens on the same sheet with 42, *Hypocrea palmicola*, and 558, *Hypocrea rufa*. There are, however, apparently four species on this sheet, and it would seem probable that the specimens submitted to Berkeley and Broome were mixed, for they apply the term " hemisphærica " to both *Hypocrea palmicola* and *Hypocrea artocreas*, though it scarcely fits either.

The specimens on decayed palm tissue, which are apparently *Hypocrea artocreas*, are discoid, with vertical sides and usually a flat upper surface, circular, up to 1·5 mm. diameter and 0·3 mm. thick, attached over the whole base, subtranslucent, reddish-brown, pruinose, with a narrow tomentose hypothallus. The perithecia are laterally oval, about 220 μ diameter and 170 μ high, with a yellowish wall. The spores are immature. Nothing matching this has been collected recently.

Hypocrea discella B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 984, as " Pallide rufa, orbicularis, applanata, supra rugosa punctata : sporidiis minoribus. On dead wood. Asci linear ; sporidia 2·5 μ long." The Thwaites's number

cited is "5 in part." This is one of the cases in which Thwaites, or probably his collector, put together several species, which he subsequently separated. The other parts of No. 5 are *Hypocrea catoptron*, 5 in part; *Hypocrea albofulva*, 5 in part; *Hypocrea citrina*, 1094 (5 in part); and *Hypocrea multiformis*, 1094, 1095, both of which numbers are "5 in part." Consequently it is to be expected that mixtures of these species will occur in all the types. In addition to the type specimen of *Hypocrea discella* in Herb. Kew, No. 1095 in the cover of *Hypocrea multiformis* is *Hypocrea discella* and *Hypocrea catoptron*, and 1095 at Peradeniya contains the same two species.

Hypocrea discella from the herbarium specimens is flattened pulvinate, more or less circular or oval, with a lobed margin, up to 1 mm. diameter, thin, upper surface slightly convex. A few specimens are red-brown, uniformly coloured, with a rounded margin, and up to 0·4 mm. thick, but the majority are thinner, with a somewhat flattened margin, red-brown or sordid yellow-brown in the centre, yellow to yellow-brown at the margin. The surface is minutely tomentose and irregular, with minute, pulvinate, perithecial elevations. The ostiola are black and slightly projecting. The internal tissue is yellowish-white, rather loose and friable, and the perithecia separate readily when mounted. The perithecia are broadly flask-shaped, up to 0·2 mm. diameter and 0·2 mm. high, crowded, situated at slightly different depths, and the wall appears black in section, but is yellow by transmitted light. The sporiferous part of the ascus measures 56 × 3 μ. The part spores are globose, 2·5–3 μ diameter, or oval, 3–4 × 2·5–3 μ, greenish-yellow, warted.

Hypocrea deplanata B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 985, as "Cremoricolor, adnata, margine brevi albo byssoidea: ostiolis impressis lætioribus. Sporidia 16, globose, forming a necklace." The type specimen is now brown, with darker ostiola, and the ostiola are slightly elevated.

When fresh this species is pale yellow or straw-coloured with yellow, translucent ostiola, and usually a broad, white, byssoid hypothallus. It is circular, orbicular, or irregularly lobed, up to 3 mm. diameter (exclusive of the hypothallus), thin, 0·2–0·3 mm. thick, pruinose becoming glabrous, with slightly elevated ostiola. The perithecia are subglobose or laterally oval, up to 0·2 mm. diameter and 0·15 mm. high, situated in a brownish-yellow layer, which occupies two-thirds the thickness of the stroma. The tissue beneath the perithecial layer is pale yellowish. The perithecial wall is pale yellow-brown, or almost hyaline. The asci are 52–58 × 3 μ. The part spores are globose, 3 μ diameter, or oval, 4–5 × 3 μ, spinulose ; in the type they are not fully mature, and apparently all are hyaline ; in a recent collection some of the asci contain a few mature spores, which are blackish yellow-green.

Hypocrea corticioides B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 986, from Thwaites 645, as "Effusa, olivacea, margine brevi byssoidea ; peritheciis nunc immersis, nunc liberis collapsis ; sporidiis ellipticis obtusis apiculatis uniseptatis. Sporidia 5–6·25 μ long."

In the type specimen the stromata are effused and flat, circular, up to 5 mm. diameter. Some of them are elevated in the centre, but that is because they are growing over swellings in the bark of the host. The surface is tomentose and the context rather loose. The colour is now somewhat olivaceous, but it would appear probable that the fungus is white when fresh. The perithecia are immersed, and the stroma is studded with red-brown ostiola, which do not project ; but part of the loose stroma may weather away, and the perithecia become superficial. The perithecia are about 0·2 mm. diameter. The asci are cylindric, eight-spored, 50 × 4 μ. The spores are oblong-oval, obtuse, one-septate, slightly constricted at the septum, hyaline, becoming pale greenish olivaceous, 5–6 × 3–3·5 μ. It is possible that they may separate into part-spores later.

Hypocrea saccharina B. & C.

This was described by Berkeley in Jour. Linn. Soc., X., p. 376. In Fungi of Ceylon, No. 987, Berkeley and Broome described a var. *agaricicola*, "peritheciis magis prominulis: junior pallida. On stems of decayed Agarics. Sporidia immature." The specimens are quite immature, and identification is impossible. No specimens have been collected recently on decayed Agarics.

Hypocrea pezizoides B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 988, from Thwaites 308, as "Orbicularis, undulata, aurantiaca, centro affixa, subtus pallida, carne alba; sporidiis globosis. At first looking like a *Midotis*, or the apothecia of some lichen, more or less margined, then expanded, $\frac{1}{4}$–$\frac{3}{4}$ inch across: sporidia 3·75–6·25 μ diameter."

This species is not uncommon on dead mango branches. The stromata are roughly circular in plan, sometimes irregularly lobed, feebly convex, undulating, up to 2 cm. diameter. They are sessile, but affixed only over a small area in the centre of the base. In small specimens the base is closely applied to the bark of the host plant, but in the larger it may be widely separated, except at the edge and the central point of attachment. The colour is orange-red above, yellowish below, and white internally. The upper surface is slightly white pruinose, and the ostiola are not evident. The stroma is 1–1·5 mm. thick. In large specimens there is often a distinct flat margin, about 0·5 mm. wide, but the stroma is convex from the beginning, not at first closed, or with an incurved margin, as might be inferred from Berkeley and Broome's description. The perithecial cavities are globose, 180–240 μ diameter, crowded in a single layer. The asci are cylindric, eight-, then sixteen-spored, 100–130 × 6–7 μ. The part-spores are oval, 6–8 × 5–6 μ, or globose, 5–6 μ, greenish hyaline, yellow in mass, spinulose.

Hypocrea jecorina B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 989, from Thwaites 33, 1097. Thwaites 1097 was part of his 33, another part being 1096, which was included under *Hypocrea multiformis*.

Berkeley and Broome's description is " Convexa, pulvinata, jecorina, demum subplicata ; ostiolis prominulis ; carne alba. On bark and wood. Sporidia 3·75–5 μ, forming a necklace."

This species is common at Hakgala, and has been collected at Peradeniya. It grows on old decaying Polypori, or more generally on Pyrenomycetæ, *e.g.*, *Nummularia pithodes*. The stromata are usually circular, regular, sometimes lobed, flattened convex, often undulating, margin rounded, up to 1 cm. diameter, 1·5 mm. thick, dark red-brown, becoming livid brown, with slightly projecting black ostiola, glabrous, opaque, usually attached only in the centre. The surface becomes wrinkled in drying. The stroma is fleshy and somewhat fragile when fresh, but compact and rather corky when dry ; internally it is white. The perithecial cavities are flask-shaped, about 200 μ high, 120–150 μ diameter, crowded, with a yellow-brown wall. The asci are 60–75 × 4 μ, cylindric, eight-, then sixteen-spored. The part-spores are spherical, greenish-hyaline, white in mass, minutely warted, 3·5–4 μ diameter.

The conidial stage of this species is a *Trichoderma*, green, with dirty green, subglobose conidia, 2·5–3 μ diameter.

Cesati described from Ceylon, *Hypocrea gelatinosa* var. *umbrina*, and this was re-described by Cooke as *Hypocrea umbrina* in Grevillea, XII., p. 78. The specimen from Cesati in Herb. Kew is *Hypocrea jecorina*.

Hypocrea catoptron B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 990, as " Minor, mellea ; peritheciis nigris, demum perlucentibus. Sporidia 6·25–5 μ."

Hypocrea catoptron is not uncommon at Peradeniya. It is up to 2 mm. diameter, circular, discoid, 0·8 mm. thick, the upper surface usually plane, the sides more or less vertical,

but the upper edge rounded and sometimes crenate, attached over the whole base. It is at first pale yellow, with pale brown ostiola, subtranslucent, fleshy; when the spores are mature it becomes pale green, with dark green ostiola. The perithecia are situated in a single layer, rather deeply sunk, globose, 0·2 mm. diameter, or laterally oval, 0·2 × 0·15 mm., with a cylindrical neck about 0·1 mm. high. The part-spores are globose, 4–6 μ diameter, or oval or subcylindric, 6–8 × 4–6 μ, blackish-green, strongly verrucose. The asci are 90–100 × 6–7 μ.

The specimens assigned to *Hypocrea catoptron* in Penzig and Saccardo, Icones Fungorum Javanicorum, Tab. XXXV., 3, appear to be a different species. According to the figure and description they are not discoid, and the part-spores are all globose.

In some specimens from Hakgala the upper surface of the stroma is strongly tuberculate. These are white, then pale yellow with green ostiola, and finally olive green. The part-spores are blackish-green, strongly verrucose, globose, 4–6 μ diameter, or oval or cuboid, 5–6 × 4 μ.

Hypocrea rufa Fr.

This was recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 991. They gave the spores as 5 μ diameter. The stromata of the Ceylon species are flattened pulvinate, convex or almost plane above, up to 3 mm. diameter and 0·7 mm. thick, usually circular, but sometimes irregular by confluence, with a rounded margin. They are attached over the whole base, except for a narrow marginal zone. When fresh, they are subtranslucent, honey-coloured, with darker ostiola; when dry, they are dark red-brown, wrinkled. Young specimens, when dry, show a white or yellowish, tomentose marginal zone, *i.e.*, the outer edge of the stroma, not a hypothallus. The perithecia are situated in a peripheral zone, 0·2 mm. deep, and are crowded, sometimes globose 0·2 mm. diameter, but usually vertically oval, 0·2 mm. high, 0·15 mm. diameter, often distorted. The wall of the perithecium is yellow-brown. The spores are hyaline, minutely

warted, globose, 4 μ diameter. Berkeley and Broome's specimen is not quite mature, and has spores globose, 4 μ diameter, or cuboid, 4 × 4·5 μ.

This differs from *Hypocrea rufa* in nearly all respects. I propose to name it *Hypocrea confusa*.

Hypocrea fusigera B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 993, from Thwaites 44, as " Effusa, tuberculata, pallida, tomentosa, ostiolis fulvis ; ascis lanceolatis, sporidiis fusiformibus uniseptatis. On leaves of some Monocotyledon. Peradeniya, November, 1867. Sporidia 75 μ long. This species approaches *Nectria*. Perithecia sometimes immersed, sometimes prominent."

Specimens have been collected recently on dead stems of *Amomum*. The stromata are effused, pulvinate, tuberculate, irregularly oval, up to 7 mm. long, and 4 mm. broad, or confluent in large patches, often with small outlying stromata, which contain only one loculus, cream-coloured or pinkish-white, somewhat pellucid, with scattered, fuscous ostiola ; margin sometimes tomentose, usually glabrous ; ostiola not projecting. When dry, they become more flattened and more strongly tuberculate, and pale reddish-ochraceous. The perithecia are globose or ovoid, 0·25–0·3 mm. broad, 0·3–0·4 mm. high, rather distant. The asci are clavate, apex rounded, 170–180 × 20 μ, eight-spored, with spores at first obliquely uniseriate, afterwards irregularly fasciculate. The spores are hyaline, fusoid, ends obtuse, one-septate, slightly constricted at the septum, not separating into two, straight or slightly curved, 72–110 × 11–13 μ. Short linear paraphyses, about 30 μ long, are present.

Berkeley and Broome's spore measurement is 75 μ. In Saccardo it is said to be 7·5 μ.

Hypocrea palmicola B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 994, but it is published there as *Hypocrea palmicola* B. & C. There does not appear to have been any previous publication of the species, and " B. & C." is no doubt

an error. The brief description is "Hemisphærica, luride rufa; sporidiis globosis 16 (No. 42). On leaves of palms, November, 1867." As noted under *Hypocrea artocreas*, Thwaites united *Hypocrea palmicola* and *Hypocrea artocreas* with *Hypocrea rufa*, and his specimens submitted to Berkeley and Broome may have been mixed. The only species in these three which could be called "hemisphærica" is that attributed to *Hypocrea rufa*.

The specimens in Herb. Kew and Herb. Peradeniya are all immature. They are discoid, circular, up to 2 mm. diameter, with the upper surface plane and minutely wrinkled, and the sides sloping backwards to the base, so that the basal area of attachment is regularly circular, and slightly narrower than the top. The upper edge is acute. The stromata are about 0·75 mm. thick. Some of them are now dark brown, others almost black.

The mature form of this species was sent to Berkeley and Broome as Thwaites 1008, and was assigned by them to *Hypocrea lenta* Fr. But *Hypocrea lenta* has hyaline spores, while the present species has green spores. Berkeley and Broome's specimen of *Hypocrea lenta* from Ceylon has green spores.

The stromata are circular, up to 3 mm. diameter, and 1 mm. thick, with the upper surface plane or slightly convex, and the upper edge usually acute, contracted below to a broad circular base. Specimens from Peradeniya (1,600 ft.) are usually flat-topped, those from Hakgala (5,600 ft.) tend to be more convex and have a less acute edge. The colour is dull green, with blackish ostiola, becoming blackish-olive, and black when dry. Internally the stromata are fleshy, and pinkish or pale flesh-coloured when fresh, becoming blackish when dry. The surface is plane, but becomes rugose on drying. The perithecia are crowded, globose, 160 μ diameter, or ovoid, 160 μ diameter and 200 μ high. The asci are 70–85 × 4–5 μ. The part-spores are vivid green or dark green, olive in old herbarium specimens, spherical, 3–4 μ diameter, or oval, 5–6 × 3–4 μ, spinulose.

This species sometimes grows on other fungi. I have collections on *Stereum lobatum* and on *Poria Ravenalæ*. It has a green *Trichoderma* stage.

Hypocrea multiformis B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 995, as "Pulvinata, umbrinella, ostiolis punctiformibus ; peritheciis immersis vel prominulis ; sporidiis moniliformibus. Sporidia 3·75 μ diameter. There are slight differences in the specimens ; but the fruit agrees in all." They cited Thwaites 1094, 1095, 1096, 33 in part.

Nos. 1094 and 1095 were part of Thwaites 5. Berkeley and Broome cited 5, 1094 in part, for their *Hypocrea citrina* var.. and 5 in part for *Hypocrea albofulva* B. & Br., *Hypocrea discella* B. & Br., and *Hypocrea catoptron* B. & Br.

In Herb. Kew and Herb. Peradeniya, Thwaites 1094 appears to be all *Hypocrea citrina* var. and *Hypocrea albofulva*. Similarly, in both herbaria, Thwaites 1095 is *Hypocrea discella* and *Hypocrea catoptron*, some of the latter very immature.

No. 1096 was part of Thwaites 33, another part being No. 1097, *Hypocrea jecorina*. The specimens in 1096 are not quite mature, but they appear to be the species described here as *Hypocrea mellea*.

The only species in this collection which has prominent perithecia is *Hypocrea discella*. It may be that there is another species in Thwaites 1094 in Herb. Kew or Herb. British Museum, to which the name *Hypocrea multiformis* might be applied, but in view of the mixture cited by Berkeley and Broome, it would seem preferable to discard the name.

Hypocrea albofulva B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 996, from Thwaites 5 in part. Their description is "Subtus sub-byssoidea, supra pallida, peritheciis fulvis notata : sporidiis globosa. On twigs, Nuwara Eliya. Sporidia 5 μ in diameter."

The stromata in the herbarium specimens are effused, flat, very thin, irregularly oval or circular, up to 3 mm. long, 2 mm. broad, and 0·2 mm. thick, pale yellow-brown with black ostiola, surface tomentose, with a white byssoid margin, and sometimes interrupted by white byssoid patches. The perithecia are laterally oval; about 0·15 mm. diameter and

0·1 mm. high, with a pale yellow-brown wall. The asci are cylindric, eight-, then sixteen-spored, the sporiferous part measuring about 48 × 3·5–4 μ. The part-spores are hyaline, coarsely warted, globose, 3·5–4 μ diameter, or oval, 4 × 3 μ.

Hypocrea citrina Fr.

This was enumerated for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 997, from Thwaites 1094, which was part of Thwaites 5. There is no Ceylon specimen in the cover of *Hypocrea citrina* in Herb. Kew, but in the cover of *Hypocrea multiformis* there are specimens, part of Thwaites 1094, marked *Hypocrea citrina* var. Most of them are immature. The following description is drawn up from fresh specimens :—

Stromata flattened pulvinate, even, circular, up to 3 mm. diameter, 0·7 mm. thick, margin rounded, attached over nearly the whole base, straw-coloured, with inconspicuous brown ostiola, glabrous, not translucent, becoming minutely wrinkled on drying ; internally white, surface layer distinctly yellow in section, perithecial walls pale yellow. Perithecia globose, about 0·15 mm. diameter, crowded. Asci, sporiferous part, about 70 × 4 μ. Part-spores hyaline, rather strongly warted, globose, 4 μ diameter, or oval, 4 × 3 μ. I propose to name this species *Hypocrea straminea*.

Hypocrea discoidea B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 998. In Michelia, I., p. 322, Saccardo transferred it to *Hypocrella*. A list of synonyms was given in a preliminary paper on *The Genera Hypocrella and Aschersonia*, in Ann. Perad., V., p. 526, and it is hoped to publish a full account of these genera shortly.

Hypocrea Bambusæ B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 999. In Michelia, I., p. 323, it was transferred to *Hypocrella*. In Ann. Perad., VI., p. 170, the writer re-described it as *Balansia Bambusæ* (B. & Br.) Petch. It is not identical with *Hypocrella axillaris* Cooke (= *Balansia axillaris* (Cooke) Petch), as stated by Massee.

Hypomyces pæonius B & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 1000, and was re-described in Ann. Perad., V., p. 284.

Hypomyces chrysostomus B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1001, and was re-described in Ann. Perad., V., p. 284.

Hypomyces chromaticus B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1002, and was re-described in Ann. Perad., V., p. 284.

Hypomyces stilbiger B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 1003. It was transferred to a new genus, *Byssostilbe*, in Ann. Perad., V., p. 292.

Megalonectria pseudotrichia (Schw.) Speg.

This species was recorded by Berkeley and Broome in Fungi of Ceylon, No. 1004, from Thwaites 28 and 48, under the name *Sphærostilbe pseudotrichia* Schw. Part of the same Thwaites's gatherings were left by Berkeley in his herbarium under the name of *Nectria fenestrata*, and the latter name was subsequently published by Cooke. Other specimens from Thwaites 48 were recorded by Berkeley and Broome in Fungi of Ceylon, No. 1009, as *Nectria coccinea* Fr. All these are *Megalonectria pseudotrichia*.

This species is very common in Ceylon. The perithecia frequently occur apart from the conidiophores, either without any conidiophores, or with the two stages on different areas of the same stem.

Sphærostilbe repens B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1005. It was re-described in Circulars and Agricultural Journal of the Royal Botanic Gardens, Peradeniya, V., No. 8.

Sphærostilbe variabilis B. & Br.

Sphærostilbe variabilis was described by Berkeley and Broome in Fungi of Ceylon, No. 1006, from Thwaites 645, as "Effusa, carnea, quandoque tenuis, quandoque placentæformis; peritheciis liberis collapsis vel eminentibus; ascis linearibus; sporidiis ellipticis utrinque leviter apiculatis uniseptatis. Accompanied by strap-shaped bodies of the same colour, which occasionally bear a head of conidia; sporidia 12·5–15 μ long, 7·5 μ wide. Some of the specimens resemble an *Hypocrea;* but these have the same conidiiferous processes."

The same Thwaites number provided also *Hypocrea corticioides.*

The specimens in the cover of *Sphærostilbe variabilis* in Herb. Kew are from Cooke's herbarium. One is mounted on a sheet, and another is contained in an envelope, which is marked *corticioides.* The remainder of Thwaites 645 is included in the cover of *Hypocrea corticioides,* but the specimens there contain both species.

Sphærostilbe variabilis, in its conidial stage, forms irregularly pulvinate stromata, up to 10 × 5 mm. These are white or pinkish, and tomentose, and bear numerous, erect, stilboid processes. The stalks of these *Stilbum* conidiophores are up to 0·75 mm. high, terete, 0·2 mm. diameter, or flattened, up to 0·4 mm. broad, pinkish-white; the head is ovoid, globose or capitate, reddish orange. Sometimes the heads of all the conidiophores on a stroma fuse into a confluent mass of spores. The conidia are oblong-oval, hyaline, 3–6 × 1·5 μ.

The perithecial stromata are in some cases flat, effused, and tomentose, and bear scattered semi-immersed perithecia. In others they are pulvinate and densely covered with perithecia, and the latter are sometimes immersed. The perithecia are globose, conical above, 0·4 mm. diameter, with a broad ostiolum, semi-translucent. The asci are cylindric, eight-spored, scarcely pedicellate; when immature the spores are obliquely uniseriate, and the asci measure 75 × 5 μ, but when mature the spores are uniseriate, and the asci 105–110 × 6 μ. The spores are narrow-oval, hyaline, sometimes subapiculate, one-septate, strongly verrucose, 9–14 × 5–6 μ.

Sphærostilbe gracilipes Tul.

This species was recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 1210, from Thwaites 27.

The specimen in Herb. Peradeniya bears *Stilbum* conidiophores, either scattered or fasciculate. They are black, becoming gray or ochraceous at the apex, up to 3 mm. high. The stalk is up to 0·2 mm. broad, and irregularly flattened, twisted, and sometimes longitudinally ridged. The head is subtranslucent, narrow-ovoid, and bears hyaline, narrow-oval spores, 4–5 × 2 μ.

With these are perithecia, either scattered, or in rows in cracks in the substratum. The perithecia are superficial, black, minutely rugose, globose, 0·3 mm. diameter, with a cylindric, or conico-cylindric, ostiolum, 0·2 mm. high and 0·15 mm. diameter. The wall of the perithecium is leathery, not carbonaceous, parenchymatous, the outer layers purple-brown and the inner hyaline. The asci are clavate, with a very long tapering pedicel, thick-walled at the apex, eight-spored, spores biseriate, 200 × 30 μ. The spores are elliptic, thick-walled, hyaline, continuous, 22–30 × 14–15 μ.

It is evident that this is not *Sphærostilbe gracilipes*. It would appear to be a *Ceratostomella*, though the ostiolum is somewhat short.

Probably the same species was collected by Beccari in Ceylon, and was described by Cesati as *Sphærostilbe incerta*. His description is " Perithecia libera, globosa, fuscella ; ascis cylindraceis octosporis, sporidiis oblongis, 10–12 × 5, obtusis, endochromate granuloso, non septatis. Conidiophora rigida, fuliginea, subulata, capitulum ochraceum sphæricum gerentia, conidiis minutis, ellipsoideis, hyalinis, vix 1·5 longis constans." As Cesati's unit was 2 μ, this gives 20–24 × 10 μ for the ascospores, and 3 μ for the conidia.

There is no specimen of *Sphærostilbe incerta* Ces. in Herb. Kew, and I have not seen the type. But Thwaites 27 may be known as *Ceratostomella incerta*, whether it is identical with Cesati's species or not.

Nectria monilifera B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 1007, as "Peritheciis ovatis coccineis ostiolo fusco; ascis lincaribus; sporidiis globosis leviter granulatis (No. 1105). Apparently on soil, or very rotten wood stained with soil. Peradeniya. Sporidia 37·5–5 μ diameter, forming a necklace." The first of these measurements is evidently an error for 3·75 μ. In Saccardo, II., 448, it was entered as *Nectriella*, while von Höhnel (Mitt. XIV., p. 28) has re-described it as *Neoskofitzia monilifera*. It has also been re-described in Ann. Perad., V., 336.

The fungus in the type specimen grew on sandy soil, not on wood. Recent examples have been found on old termite combs, and it is probable that the latter form its usual habitat. The perithecia are superficial, scattered or clustered, at first red, then dirty brown, 150–400 μ diameter. The asci are cylindric, about 50 × 4–6 μ, eight-spored, with uniseptate spores 7 × 3·5 μ, which separate into globose, rough, olive-green, or yellow-green, part-spores, 3–3·5 μ. The wall of the perithecium in old examples appears pruinose; immature specimens bear numerous hairs, up to 50 μ long, 8 μ diameter two- to four-septate, strongly constricted at the septa. The sixteen part-spores in the ascus are uniseriate, or biseriate, the latter due to an obliquely uniseriate arrangement of the original eight spores.

This appears to be identical with *Neoskofitzia termitum* v. H., though von Höhnel considers the two species distinct.

Nectria flavolanata B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1008, as "Peritheciis primum villo flavo lanatis, e floccis erectis apice granulatis, conidiophoris; ascis clavatis; sporidiis uniseptatis (Nos. 239 b, 1103). On bark. Central Province. The flocci of the indumentum are of two kinds: the one slender, clavate, inarticulate, bearing oblong, sometimes uniseptate, conidia 7·5 μ long; others are thicker and articulated, with clavate granulated apices and a ring of granules, some oblong, triseptate, 25 μ long, others fusiform.

62·5 μ long, besides which there are sometimes round curved hairs ; sporidia 12·5–15 μ long, 6·25 μ wide."

Under *Nectria flavolanata* in Herb. Kew are Thwaites 1103 (239 in part) marked by Thwaites, "apparently No. 1102 infected with a yellow mould," and another sheet marked "239 *Nectria fulvo-lanata* B. & Br. *Hypoxylon quisquiliarum* Mont." The *Nectria* in the latter case is *N. flavolanata*. In explanation of these data it must be noted that Thwaites put together several gatherings under the number 239, and subsequently separated them. 239*b*, which was *N. flavolanata*, then became 1103, while 239*a*, which was *Hypoxylon quisquiliarum*, became 1072. The specimen in Herb. Peradeniya is marked 1103 (239 part) "apparently 1102 infected with a mould." The Peradeniya specimen is the same as that at Kew.

In the type specimen the perithecia are scattered, or aggregated in clusters up to 2 mm. diameter. They are ovoid, 0·3 mm. diameter, 0·4 mm. high, ostiolum slightly papillate, sometimes collapsing when dry, rather pale red, darker round the ostiolum, covered with minute yellow flocci, densely below, more sparsely above. In the Peradeniya specimen the yellow, or greenish-yellow, mycelium sometimes spreads over the surrounding bark. The hairs are yellow, flexuose, usually short, up to 90 μ long, 4–8 μ diameter, septate, sometimes inflated at the tips, minutely spinulose, often encrusted, often arising from the perithecium wall in tufts. There are also shorter, stouter, more rigid, recurved hairs. The wall of the perithecium is composed of thick-walled polygonal cells about 10 μ broad, and appears areolated when mounted ; it sometimes bears a few minute warts. Round the ostiolum the cells are tangentially elongated. When mounted, the wall sometimes appears yellow, sometimes red-brown. The asci are eight-spored, with spores usually biseriate, clavate, shortly pedicellate, 50–70 × 8–10 μ. A few strap-shaped paraphyses are present, but they do not appear to be septate. The spores are narrow-oval to oblong-oval, sometimes slightly fusoid, one-septate, not constricted, wall striate, hyaline, 15–17 × 5–7 μ, exceptionally 13 × 6 μ, or 16 × 9 μ. I do not find the conidia described by Berkeley and Broome ; obviously some of them are *Fusarium* spores.

In Fragmente zur Mykologie, Mitt. XIV., p. 31 (368), von Höhnel records for Ceylon *Nectria flocculenta*, which he found in the type specimen of *Nectria stenospora* B. & Br. in Herb. Kew, and suggests that it is identical with *Nectria flavolanata* B. & Br. The specimens in Herb. Kew in the type of *N. stenospora* which are marked *N. flocculenta* by von Höhnel are identical in perithecial wall and hairs with *N. flavolanata*, but their spores are oval, thin-walled, 9–10 × 3–5 μ. Elsewhere, von Höhnel gives 9–10 × 3–4 μ for the spores of *N. luteopilosa* Zimm., which he regards as identical with *N. flocculenta* v. H.

It would appear from the above that *Nectria flocculenta* differs from *Nectria flavolanata* in its smaller spores, but recent gatherings tend to show that the more correct interpretation is that the spores are subject to considerable variation in size. In No. 2151 in Herb. Peradeniya the perithecia are those of *N. flavolanata*, though the hairs are poorly developed, but the spores are thin-walled, obscurely striate, 10–13 × 3–3·5 μ. In another gathering, No. 4279, in Herb. Peradeniya, the perithecia have a well-developed covering of hairs agreeing exactly with *N. flavolanata*, but while one slide shows oval, striate spores, 13–17 × 6–8 μ, another shows thin-walled, narrow-oval, or oblong-oval, spores, 10–13 × 3–3·5 μ. These smaller, thin-walled spores appear to be quite mature.

It may be noted that the measurements of these thin-walled spores agree with those given by Zimmermann for the conidial (*Leptotrichum*) stage of *N. luteopilosa*. In the present case, however, they are undoubtedly ascospores.

Forms of *Nectria flavolanata*, in which the indumentum is poorly developed, are of frequent occurrence. In some of these a few short hyphæ of the typical character are present; in others there is only a yellow incrustation on the wall of the perithecium.

Nectria coccinea Fr.

This was recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 1009, from Thwaites 48. Both in Herb. Kew and Herb. Peradeniya the specimens are *Megalonectria pseudotricha* (Schw.) Speg.

It has already been noted that Thwaites 48 also provided *Sphærostilbe pseudotrichia* Schw., Fungi of Ceylon, No. 1004, while Cooke described from it *Nectria fenestrata* " Berk. & Curt." in Grevillea, XII., p. 81. The latter species is also *Megalonectria pseudotrichia* (*cf.* Ann. Perad., VI., p. 172).

Nectria bactridioides B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1010, from Thwaites 58. The description is " Cæspitosa, minutissima ; peritheciis ovatis in pulvinulo sitis ; sporidiis metulæformibus uniseptatis. Looks like a *Bactridium ;* perithecia scarcely visible without a lens ; sporidia 12·5 × 6·25 μ."

The type specimens are in Herb. Kew, and there are also specimens in Herb. Peradeniya. In Herb. Peradeniya the specimen is marked " 58 and 537 (666 part)," and there is also another unnamed specimen marked " 666 p." No. 537 was not cited by Berkeley and Broome ; it is chiefly a *Hymenula,* with some immature stromata, which may be immature *N. bactridioides,* while the specimen " 666 p." is also *Hymenula.*

The stromata are pulvinate, up to 2 mm. diameter and 1·5 mm. high, fleshy, reddish-orange in fresh specimens, minutely rough. The perithecia are crowded, superficial, or slightly immersed, flask-shaped, 0·2–0·25 mm. high and 0·18 mm. diameter, smooth, subtranslucent. The asci are cylindric, very shortly pedicellate, 60–70 × 8 μ, eight-spored, with uniseriate spores. The spores are ellipsoid, with rounded ends, not constricted, hyaline, becoming pale yellow-brown, very minutely warted. In the type the spores measure 8–12 × 4–5 μ ; in a recent gathering (No. 4352 in Herb. Peradeniya) they are 11–13 × 6–7 μ.

Nectria stenospora B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1011, as " Cæspitosa, e matrice alba oriunda ; peritheciis minutis pellucido-coccineis collapsis ; sporidiis angustis uniseptatis. On soft decaying stems. South of the Island, July, 1868. Sporidia 10–12·5 μ long, 2·5–3·75 μ wide."

The specimen was part of Thwaites 647, a number which provided *Nectria stenospora*, *Nectria trichospora*, *Nectria sanguinea*, *Nectria bicolor*, *Nectria Bambusæ*, and *Nectria pityrodes* var. *saccharina*. Consequently, as the specimens of Ceylon Nectrias were very imperfectly sorted out, it is to be expected that the parts of Thwaites 647 under the different names will be mixtures of several species. von Höhnel, on an examination of the type of *Nectria stenospora* in Herb. Kew, found that it contained five species, viz., *Nectria stenospora*, *Nectria bicolor*, *Nectria luteococcinea* (= *N. hæmatococca* B. & Br.), *Calonectria sulcata* (= *Calonectria rigidiuscula* B. & Br.), and *Nectria flocculenta* (= *Nectria flavolanata* B. & Br.). Unfortunately, though von Höhnel marked the position of the last four species on the herbarium sheet, he did not indicate which specimens he took to be *Nectria stenospora*, and there do not appear to be any specimens of the latter now remaining.

According to von Höhnel (Mitt. XIV., p. 31), *Nectria stenospora* occurs very sparingly in the type specimen. The perithecia are situated in small groups on a feebly developed, erumpent stroma, and are cinnabar-red, globose, not collapsing, smooth, 250 to 280 μ broad, with a small, flat, ostiolar papilla. The cells of the perithecial wall are 8–10 μ broad, irregular and thick-walled. The asci are clavate, eight-spored, with biseriate spores, 50–60 × 9–10 μ. The spores are straight, elongated-elliptic, with obtuse ends, not constricted at the septum, hyaline, with four or five longitudinal striæ, 10–14 × 4–5 μ.

It will be noted that von Höhnel's description differs in several points from that of Berkeley and Broome. The latter described their species as arising from a white matrix, and having translucent collapsing perithecia, with narrow spores. It would consequently seem doubtful whether von Höhnel's re-description really refers to Berkeley and Broome's species; it would appear to refer to smooth examples of *Nectria flavolanata*.

In Circulars of the Royal Botanic Gardens, Peradeniya, Vol. V., No. 13, p. 147, the writer recorded *Nectria stenospora* on cacao pods in Ceylon. The spores in these specimens were narrow-oval, or often oblongo-fusoid with straight sides; the

former measured 8–13 × 4–5 μ, while the latter, from the same perithecium, were 11–13 × 2–2·5 μ. A further examination of these specimens, and a comparison with a number of others, in connection with the present revision, has convinced me that these are only nearly bald specimens of *Nectria flavolanata*. The typical hairs can be found in many cases near the base of the perithecia.

It would seem probable, in view of the foregoing, that Berkeley and Broome examined a nearly smooth specimen of *Nectria flavolanata* for their spore measurement of *Nectria stenospora*. These are the only spores I have seen in a Ceylon Nectria which would warrant the name *stenospora*.

There is, however, another species *ex* Thwaites 647, which has claims to be considered *Nectria stenospora*. It occurs in the cover of *Nectria bicolor* in Herb. Kew, and again, evidently part of the same collection, in the cover of *Nectria sanguinea*. The latter specimen is marked Ceylon, but is not numbered. In Herb. Peradeniya it is included in the sheet, Thwaites 647.

The perithecia of this last species may occur singly, in which case they appear superficial, but they are usually densely congregated on an erumpent stroma, in pulvinate masses up to 5 mm. diameter. The perithecia are at first bright red, but when old they become dark red. They are subtranslucent, and smooth, without warts or hairs. The stroma is parenchymatous, with small thick-walled cells, or somewhat sclerotioid. It is paler than the perithecia, being orange red above, and yellow internally, sometimes almost hyaline at the base. When some of the perithecia have been broken away, the specimen appears bicolored, the perithecia showing dark red, and the surface of the stroma orange red.

When young, the perithecia collapse laterally. The older specimens apparently do not collapse. In most of the Kew specimens the perithecia are collapsed laterally if perfect, but many have been broken, and only the lower part is left as a cup. In Herb. Peradeniya one part of the specimen shows fully mature, unbroken perithecia. The immature perithecia appear conoid; the mature perithecia are ovoid or suburceolate,

with a broadly conical ostiolum, which is often darker than the rest of the perithecium, with a minute ochraceous apex; they are 0·15–0·25 mm. in diameter, and slightly more in height. The wall of the perithecium in section is yellow internally and red towards the exterior; it is composed of thick-walled cells, about 8 μ broad, the outer layer being somewhat amorphous. The asci are narrow-clavate, sessile, with obliquely uniseriate spores, 50–65 × 6–9 μ; sometimes the spores are almost transverse, and the asci 11 μ broad. Linear paraphyses are present. The spores are oval, obtuse, hyaline, not constricted at the septum, 10–13 × 4–7 μ.

The above species appears to me to correspond best with Berkeley and Broome's description. It is cæspitose, with a stroma, which, though not white, is paler than the perithecia, and perithecia, which are for the most part collapsed. It is parasitic on *Sphæriaceæ*.

Nectria villigera B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1012, from Thwaites 156. Their description is "Conglomerata: peritheciis ovatis rugosis pallidis; floccis conidiiferis conidiis longiseptatis magnis ellipticis vel obovatis. Apparently on some decaying fungus. Surface of perithecia rough."

No specimen of this has been found in the Kew, British Museum, or Peradeniya Herbaria, and the description is too brief to be of any service.

Nectria volutella B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1013, Thwaites's numbers 445 and 448 being cited. The description is "Carneo-pallida, ostiolo obscuriore, setis pallidis ornata; sporidiis fusiformibus, uno latere ventricosis, biseptatis. On leaves of *Atalantia monophylla* on a lichenoid hispid white crust. Looks at first sight just like a *Volutella*: sporidia 37·5 μ long."

Thwaites 445 and 448 are two entirely different things. 445 bears brown circular patches, which become gray in the

centre, each composed of minute, circular, or oval, close-set depressed spots, with a raised margin, which bear clustered or scattered pycnidia (?). These presumed pycnidia are subepidermal, erumpent, globose, or sub-conoid, 110–140 μ diameter, 80–110 μ high, thick-walled. Apparently they are all immature, and nothing resembling them has been collected recently.

Thwaites 448 bears the *Nectria*. In Herb. Kew the specimen has by some confusion of numbers been labelled 445, but its duplicates are correctly numbered 448. In addition to the *Nectria*, the specimens bear a discomycetous fructification (? of a lichen); consequently part of Thwaites 448 was included in Ceylon Lichens as No. 339, but it was apparently not named by Leighton.

Nectria volutella is parasitic on a *Meliola*, which is covered by its hyaline mycelium, thus forming the lichenoid white crust noted by Berkeley and Broome. The perithecia are scattered, depressed-globose, 0·25 mm. diameter, cream-coloured, pruinose, naked in the upper third, but bearing spreading, rigid, hyaline hairs, up to 0·2 mm. long, in the lower two-thirds. The hairs are thick-walled, about 5 μ diameter, septate, tapering to the apex. The asci are clavate, thick-walled, shortly pedicellate, 160 × 20 μ, eight-spored, spores biseriate. The spores are hyaline, narrow-oval or lanceolate, three to five septate, 32–36 × 7–8 μ.

This species was transferred to *Calonectria* by Saccardo, in Michelia, I., p. 309. Cooke listed it as *Lasionectria* in Grevillea, XII., p. 112, and noted that the spores were two to five septate.

Nectria trichospora B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1014, as "Peritheciis ovatis elongatis asperis coccineis; ascis clavatis, sporidiis fusiformibus longissimis multiseptatis. Sporidia 225 μ long." It was said to be Thwaites 29, and 647 in part; as in other cases, 647 is part of Thwaites 29. The specimen in Herb. Peradeniya is marked 1104 (29 part); it contains *N. trichospora* and *Nectria hæmatococca*.

Saccardo, in Michelia, I., p. 323, made this the type species of the genus *Ophionectria*. It was re-described in Ann. Perad., V., p. 285. The perithecia are scattered or clustered on a thin, radiating, red-brown or whitish, byssoid stroma; they are blood red, ovoid, 0·4 mm. high, 0·25 mm. diameter, apex subtruncate, rugose; ostiolum minute, scarcely evident. Asci 200–250 × 20–25 μ, cylindric, eight-spored. Spores 180–240 × 6–8 μ, multiseptate, not constricted, vermiform, either of uniform diameter, or tapering somewhat to either end.

As previously pointed out, this falls in the genus *Tubeufia* Penz. and Sacc., which consequently is superfluous.

Nectria Bambusæ B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 1015, as "Sparsa, pallide aurantiaco-rubra, conica acuta, glaberima; ascis brevibus clavatis; sporidiis minimis. On Bamboo. Sporidia 10 μ long." Thwaites's numbers 29, 64, and 647 in part were cited, but this is subject to the correction that 647 was part of 29. In Saccardo, II., p. 450, it was placed in *Nectriella*.

The perithecia in the type are superficial, scattered or clustered, orange red to blood red, subtranslucent, conoid, shining, slightly darker round the ostiolum, 0·15 mm. diameter, 0·2 mm. high. A fine, white, cobwebby mycelium spreads over the substratum and the perithecia, but it is doubtful whether this belongs to the *Nectria*. The wall is composed of small, thick-walled cells, and bears a few small processes, about 5 μ high and 4 μ diameter. The asci are clavate, generally long-pedicelled, 50–65 × 6–8 μ, with obliquely biseriate spores, and furnished with linear paraphyses. The spores are narrow-oval, thin-walled, strongly two-guttulate, 8–10 × 3–3·5 μ. Most of them are immature, but some are clearly one-septate.

von Höhnel (Mitt. XIV., p. 354) transferred this species to *Pseudonectria* (*Pseudonectria* Seaver = *Nectriella* Sacc., non Fck.), but from the type specimen it is a *Nectria*.

Nectria Peziza Fr.

This was recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 1016, from Thwaites 29.

There is no Ceylon specimen in the cover of *Nectria Peziza* in Herb. Kew, but in the cover of *Nectria hæmatococca* there is a specimen No. 29 marked "*Nectria Peziza*," with "*hæmatococca*" written by Berkeley above the specific name. The specimens are *Nectria hæmatococca* B. & Br.

Nectria sanguinea Fr.

This was recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 1017, Thwaites's numbers 647 and 29 in part being cited. The citation is incorrect in suggesting that two of Thwaites's gatherings were referred to this species, as 647 was part of Thwaites 29.

In Herb. Kew there is a Ceylon gathering containing five pieces marked Thwaites 29, "*N. sanguinea, cinnabarina.*" It contains *Nectria striatospora* Zimm. and *Nectria hæmatococca.*

There is also another unnumbered Ceylon specimen in Herb. Kew, labelled *N. sanguinea,* which differs from both the above, and is the species here assumed to be *Nectria stenospora.*

Cesati also recorded *Nectria sanguinea* Fr. for Ceylon with a query, his specimens being imperfect. They were collected by Beccari.

Nectria hæmatococca B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 1018, as "Minuta, conferta, rugosa, coccinea, dein irregulariter vel cupulari collapsa ; sporidiis uniseptatis (No. 1104, No. 29 in part). Sporidia 12·5–15 μ."

In the type specimen in Herb. Kew the perithecia are superficial, without any stroma, but surrounded by the remains of the hyphæ of the *Fusarium* stage, scattered, or gregarious in large patches, blood red, subtransiucent, covered with yellowish-red, loose-looking warts, conoid, 0·2–0·25 mm. diameter. When mounted the wall appears pale yellow, and composed of large cells. The warts are up to 100 μ diameter

at the base, and built up of two or three layers of polygonal cells up to 40 μ diameter, or they may be reduced to single cells projecting from the perithecial wall. The asci are clavate, shortly pedicellate, 55–70 × 12 μ, eight-spored, with spores obliquely uniseriate, or uniseriate below and biseriate above, There are no true paraphyses. The spores are, in general, narrow-oval or oblong-oval, ends obtuse, not constricted at the septum, hyaline, becoming pale brownish, 12–16 × 6–7 μ. A few spores have more rounded ends, and are constricted at the septum.

In the type of *Nectria stenospora* in Herb. Kew von Höhnel found specimens of a *Nectria* which he assigned to *Nectria luteococcinea* v. H. These specimens are identical with *Nectria hæmatococca* B. & Br. They have exactly the same warts, and their spores measure 12–15 × 6–7 μ. Accepting von Höhnel's determination, *Nectria luteococcinea* is identical with *Nectria hæmatococca*.

In Fungi of Ceylon, No. 1016, Berkeley and Broome recorded *Nectria Peziza* Fr. (No. 29 in part). There is no Ceylon specimen in the cover of *Nectria Peziza* in Herb. Kew, but in the cover of *Nectria hæmatococca* there is No. 29, marked "*Nectria Peziza*," with "*hæmatococca*" written by Berkeley above the specific name. These specimens are *Nectria hæmatococca*. There are also Ceylon specimens of *N. hæmatococca* in the cover of *Nectria sanguinea* in Herb. Kew.

In Annals Peradeniya, III., p. 4, the writer described *Nectria diversispora* Petch from dead stems of *Hevea* and Tea. This species has exactly the same perithecia as *N. hæmatococca*, but its spores are slightly smaller, and frequently differ considerably in shape. In some gatherings they measure 9–12 × 4–5 μ, and are oval, often constricted at the septum, sometimes with one cell larger than the other, and with one or both ends broadly rounded. In others they are broader, seldom constricted, 9–10 × 5–6 μ. Another gathering has spores 9–13 × 5–6 μ, broadly oval, not constricted. The asci are usually about 50 × 8 μ, the measurement given in the description being an error. These gatherings grade up so closely to *Nectria hæmatococca* that it is not possible to maintain the two species distinct.

Nectria hæmatococca is one of the commonest of Ceylon Nectrias, and occurs in abundance on dead *Hevea brasiliensis*, tea, &c. Rutgers has described, from dead *Hevea brasiliensis*, *Nectria cancri*, which agrees in many points with the smaller-spored forms of *N. hæmatococca*. Rutgers does not mention the warts on the perithecium in his description, but he shows them in his figure. He gives the asci as 90 × 6 μ, and the ascospores as 10–13 × 3–5 μ, distinctly constricted. The shape of the spores matches that of the spores of the Ceylon form previously named *Nectria diversispora*. Rutger's measurements are from specimens grown in pure culture.

In a paper entitled "The Fusariums from cankered cacao bark, and *Nectria cancri* nova species" (Ann. Jard. Bot. Buitenzorg, Ser. 2, XII., pp. 59–64), Rutgers distinguishes two species of *Fusarium*, one of which he identifies with *Fusarium* (*Spicaria*) *colorans* de Jonge, and the other with *Fusarium theobromæ* Appel and Strunk. In culture, *Fusarium theobromæ* produced perithecia, which were named by Rutgers *Nectria cancri*. It has previously been pointed out that the two Fusariums on cankered cacao bark are those of *Nectria diversispora* and *Calonectria rigidiuscula* (*C. cremea* Zimm.), and that the *Fusarium* which produces the red colour in cultures (*Fusarium colorans*) is that of the latter species (Circulars, Royal Botanic Gardens, Peradeniya, V., No. 13).

Nectria coffeicola Zimm., from the description and figures, appears to be also *Nectria hæmatococca*.

Nectria fuliginosa B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1019, from Thwaites 146, as "Conferta : peritheciis fuligineis varie collapsis lævibus ; sporidiis metulæformibus uniseptatis. Sporidia 15–17·5 μ long."

In the cotype in Herb. Peradeniya the perithecia are scattered, or in small pulvinate groups on a feebly developed, erumpent stroma, globose, about 0·2 mm. diameter, collapsing irregularly, now black or brownish-black, pruinose. The wall is composed of rather small cells, and is blackish-brown when mounted ; it bears small warts, sometimes conical and up to 40 μ high, and projecting cells, which are sometimes

one-septate. The spores are elliptic to subfusoid, not, or slightly, constricted, hyaline, then brown, strongly verrucose, the warts sometimes arranged in longitudinal rows, 8–13 × 4–6 μ, exceptionally 14 × 7 μ. The asci are clavate, sessile, eight-spored, spores obliquely uniseriate, 70 × 6–8 μ.

Cooke (Grevillea, XII., p. 110) transferred this species to *Cosmospora*, as a subgenus of *Dialonectria*.

Nectria suffulta B. & C.

This species was originally described by Berkeley from Cuba in Jour. Linn. Soc., X., p. 378. Subsequently it was recorded for Ceylon in Fungi of Ceylon, No. 1020, from Thwaites 1106, 1107. Von Höhnel, who has examined a Kew specimen, states, in Mitt., XIV., p. 36, that the specimen from Ceylon is quite different from that from Cuba. In an earlier publication, von Höhnel and Weese (Ann. Myc., VIII., p. 466) stated that *Nectria leucotricha* Penz. and Sacc. is identical with *Nectria suffulta* B. & Br., 1873 ; but the latter is probably an error for B. & C.

In Herb. Peradeniya Thwaites 1107 contains two species. One of these is *Nectriella gigaspora* Cooke and Massee. The other is in bad condition, but appears to be the same as the species in Thwaites 1106. Its spores are broadly oval, thick-walled, 10–12 × 5–6 μ, and often almost transverse in the ascus.

Thwaites 1106 in Herb. Peradeniya contains six pieces ; two of these do not now bear anything recognizable ; the other four bear the species which was regarded by Berkeley and Broome as *Nectria suffulta*.

The perithecia are about 0·25 mm. diameter, superficial, with sparse, white, radiating hyphæ extending from the lower part of the perithecium to the substratum. They are scattered, or in small groups, or lines, of three or four, and in the latter case they appear confluent. The wall is rather thick, collapsing, pruinose, dark red, translucent. The basal hyphæ are simple, rather thick-walled, smooth, and 3–4 μ diameter. The asci are sessile, broadly clavate, about 36 × 9–11 μ, with obliquely uniseriate spores. The spores are oval, ends obtuse, not, or slightly, constricted at the septum, rather thick-walled when mature, 9–13 × 4–6 μ.

In recent gatherings of this species, the perithecia are about 0·35 mm. diameter, with a pruinose wall, and are furnished at first with white, conical, erect fascicles of hyphæ, up to 100 μ high, scattered over the surface. These processes are deciduous, and none can be found on the old herbarium specimens at Peradeniya. The perithecia are brownish-red and subtranslucent at first, but become ochraceous and opaque when old. The perithecial wall has an inner layer of large cells, which, in general, is obscured by a small-celled pruinose layer, but in some gatherings the outer layer is only feebly developed. The basal hyphæ are usually weakly developed, and in some examples barely evident. The spores measure 10–12 × 5 μ, and are not thick-walled.

As this species does not appear to have been named, it may be known as *Nectria confluens*. *Nectria leucotricha* Penz. and Sacc. has spores, 16–20 × 4–5 μ.

Nectria pulcherrima B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1021, as "Cæspitosa : peritheciis lentis furfuraceis coccineis ostiolo papillæformi ; sporidiis biseriatis fusiformibus quadrinucleatis." The type specimen was Thwaites 1102, which was another part of the miscellaneous gathering Thwaites 29. In Herb. Peradeniya, Thwaites 1102 contains *Nectria pulcherrima* and *Nectria striatospora* Zimm.

The perithecia are usually clustered on an erumpent stroma, in pulvinate groups up to 3 mm. diameter. A rhizomorphic mycelium, similar to that of *Sphærostilbe repens*, but thinner, permeates the bark of the host plant in thin strands or sheets. The perithecia are globose, 0·5 mm. diameter, with a conical ostiolum ; at first they appear orange red, the wall being red, or brownish-red, thickly covered with irregular, yellow, pulvinate masses, with the ostiolum darker, but when old they become dark red and almost glabrous. The amount of the yellow covering varies ; in the type specimen the perithecia are thickly encrusted, but in the cotype in Herb. Peradeniya the perithecia are darker, and sometimes merely pruinose.

The wall is red-brown when mounted, stout, but composed of rather small cells The yellow covering consists of somewhat loosely built warts, composed of large, very thick-walled cells.

The asci are narrow-clavate, eight-spored, with obliquely uniseriate spores, 110 × 9–10 μ. The spores are oval, ends obtuse, one-septate, scarcely constricted, somewhat attenuated towards one end, wall striate, 24–28 × 8–9 μ in the type specimen.

Berkeley and Broome described the spores as quadrinucleate, and hence it is listed in Saccardo as *Calonectria*. Cooke (Grevillea, XII., p. 107) included it in *Lepidonectria*. This is a common species on Leguminous trees in Ceylon, and frequently parasitic. I have never observed other than one-septate spores. The asci are sometimes four-spored, and the spores most generally 17–25 × 8–9 μ. In a collection from Hapugastenna, No. 2936, the wall is yellow when mounted, the asci 55–65 × 8–10 μ, and the spores 12–18 × 5–6 μ.

Nectria cinnabarina Fr.

This species was recorded for Ceylon by Berkeley and Broome in Fungi of Ceylon, No. 1022, from Thwaites 1102 in part.

The specimen in Herb. Kew is apparently that referred to under *Nectria sanguinea*. It is marked 29 and labelled "*N. sanguinea, cinnabarina*." The corresponding specimen in Herb. Peradeniya is marked 1102 (29 part), and contains *Nectria striatospora* Zimm. and *Nectria pulcherrima* B. & Br. Thus, the number 29 on the Kew specimen is due to the fact that Thwaites 29 was a composite collection which he subsequently divided, one of the parts being then numbered 1102.

Cesati recorded *Nectria cinnabarina* for Ceylon, from specimens collected by Beccari on Pidurutalagala. He added the note : "De *N. pytirode* Montg. suspicatus sum, quæ autem ascos clavatos 4-sporos gerit, sporidiaque magis cymbiformia." These specimens have not been re-examined.

Nectria bicolor B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 1023, as " Cæspitosa, pallide coccinea vel ochracea, lævis ; sporidiis minoribus oblongo-ellipiticis uniseptatis. Sporidia 8·75 μ long, 2·5 μ broad." The type is Thwaites 647 in part. The co-type in Herb. Peradeniya is marked 647 (29 part), and is on the same sheet as *N. Bambusæ* and *N. stenospora.*

The perithecia are conoid, 0·2 mm. diameter, apex acute, minutely pruinose ; when immature they are reddish-brown and somewhat translucent, but when mature they are pale ochraceous and opaque. In the type they are seated in groups on a horny-looking stroma, which sometimes extends beyond them. The asci are clavate, eight-spored, with spores biseriate above, about 40 × 8 μ. The spores are narrow-oval to subfusoid, one-septate, not constricted, minutely rough, ends rounded, sometimes acuminate, usually 9–12 × 3–4 μ, sometimes 10–14 × 4–5 μ.

In a recent gathering, which developed on the cut cross section of a *Hevea* log, the perithecia are scattered or crowded, without any evident stroma (3067 in Herb. Peradeniya).

Nectria rigidiuscula B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 1024, as " Cæspitosa ; peritheciis ovatis pallide coccineis vix collabentibus ; sporidiis submetulæformibus quadrinucleatis, demum 3-septatis. Allied to *N. ochraceo-pallida*, but of a very different colour and appearance. Sporidia 25 μ long." The type specimen was Thwaites 173 c. In Saccardo this species was listed as *Calonectria.* The type specimen is not in Herb. Kew, but in Herb. British Museum, from Broome's herbarium. Examination shows that it is identical with the later *Calonectria sulcata* Starb. and *Calonectria Meliæ* Zimm. von Höhnel has recorded Ceylon specimens from the type of *Nectria stenospora* B. & Br.

This is one of the commonest Ceylon Nectrias, and occurs in abundance on dead cacao, *Hevea*, &c., with *Nectria hæmatococca.* The perithecia are scattered or crowded, amber to

pale yellowish-white, subglobose, 0·25 mm. diameter, covered with large, more or less compact, rounded warts. In the type the asci are clavate, shortly pedicellate, inflated at the base, four-spored, 80 × 14 μ, with linear paraphyses. The spores are hyaline, oblong-oval or subcymbiform, ends rounded, three-septate, not constricted, 24-28 × 8–9 μ.

The perithecia are sometimes superficial, sometimes on linear stromata emerging through cracks in the bark. In No. 3015 in Herb. Peradeniya, the asci are 90–100 × 9–11 μ, four-spored, with spores 19–28 × 7–11 μ, the shorter spores usually the broader, *e.g.*, 19–23 × 10 μ, and 21–28 × 7–8 μ. In another collection the asci are four-spored, with spores 24–30 × 9–10 μ, three-septate, with occasionally four-septate spores, 29–31 × 9 μ. Specimens developed in culture had asci 85–110 × 8–12 μ, four-spored, with spores 19–29 × 8–10 μ.

This species is probably identical with *Calonectria flavida* Mass., recorded on Cacao from the West Indies, but apparently not described. Its *Fusarium* stage appears to be the same as *Spicaria colorans* de Jonge. It has already been recorded as *Calonectria rigidiuscula* B. & Br. in Ann. Perad., VI., p. 172.

Nectria byssicola B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1025, as "Cæspitosa, pallide aurantiaca, e strato tenui byssoideo oriunda; peritheciis furfuraceis collabentibus; sporidiis angustis uniseptatis. Sporidia 12·5 μ long, 3–4 μ wide." It was part of Thwaites 173. The specimen in Herb. Peradeniya contains *Nectria byssicola, Nectria confusa, N. subquaternata, Megalonectria pseudotrichia,* and *N. dealbata.*

The perithecia are globose, 0·4 mm. diameter, brownish-red, pruinose, subtranslucent, scattered, or clustered in pulvinate groups, on a thin, indefinite, whitish film of mycelium. The wall of the perithecium is composed of small cells, and bears small rounded warts of small, or collapsed, cells, about 50 μ in diameter and 30 μ high. When mounted the wall appears yellow. The asci are narrow-oval, scarcely pedicellate,

64–80 × 12–14 μ, eight-spored, with spores biseriate, or uniseriate below and biseriate above. The spores are oval, not constricted, one-septate, hyaline, with a striate wall, ends rounded, 13–18 × 6–7 μ.

Nectria subquaternata B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1026, as "Subcæspitosa ; peritheciis pallide opacis ; sporidiis oblongis submetulæformibus uniseptatis. Often four or five together with a depression in the centre ; sporidia 12 μ long." The specimen was Thwaites 173 *a*. In Herb. Peradeniya this species is mixed with *Nectria byssicola* and others. According to von Höhnel, the Kew specimen contains *Calonectria Meliæ* Zimm. (= *Calonectria rigidiuscula*), *Nectria subquaternata*, and an unnamed species which he has described as *Nectria confusa*.

Nectria subquaternata has perithecia, 0·25 mm. diameter, subglobose, with a minute conical ostiolum, pale flesh-coloured, thickly covered with large, compact, pallid or yellowish-white warts. They are usually densely crowded on a fleshy stroma about 3 mm. long and broad, but sometimes are scattered and superficial. The asci are narrow-clavate, sessile, 50–60 × 6–10 μ, eight-spored, with usually obliquely uniseriate spores, and furnished with linear paraphyses, slightly inflated at the tip. The spores are narrow-oval to oblong-oval, with rounded ends, hyaline, one-septate, not constricted, 10–13 × 4–5 μ.

According to von Höhnel (Mitt. XIV., p. 34) this species is identical with *Nectria squamuligera* Sacc., 1875, *Nectria granuligera* Starb., 1892, and *Nectria subsquamuligera* Henn. & Nym., 1899.

As pointed out by von Höhnel (*loc. cit.*), Berkeley and Broome's statement that the perithecia are in groups of four or five, with a depression in the centre, does not refer to *Nectria subquaternata*, but to one of the other species included with it, viz., *Nectria confusa* v. H.

Nectria pityrodes Mont.

Berkeley and Broome recorded this species for Ceylon in Fungi of Ceylon, No. 1027. They cited Thwaites 173 *b*, as *Nectria pityrodes*, and Thwaites 29 (in part) as var. *saccharina*, adding the note : " Resembling a pale form of *N. cinnabarina*, but with longer different-shaped sporidia. Cæspitose, pale orange, furfuraceous, at length collapsed, ostiolum dimpled, sporidia cymbiform, uniseptate, 25–40 μ. long." There does not appear to have been more than one collection.

von Höhnel, who has examined the type specimen, states that it is quite different from *Nectria pityrodes* Mont., and has described it as *Nectria Berkeleyi* (Mitt. XIV., p. 17).

The perithecia are globose, about 0·4 mm. diameter, orange yellow, subtranslucent, in small pulvinate groups on an erumpent stroma. The wall is densely covered with large, rough, loose-looking warts. The asci are clavate, sessile, eight-spored, about 90 × 20 μ. The spores are subcymbiform, flat, or slightly concave, on one side, not constricted at the septum, with rounded ends, 24–30 × 9–12 μ.

Nectria aurantiicola B. & Br.

This was described by Berkeley and Broome in Fungi of Ceylon, No. 1028, on a scale insect on orange. von Höhnel has transferred it to *Corallomyces* (Mitt. XIV., No. 729). It is a *Sphærostilbe*, and will stand as *Sphærostilbe aurantiicola* (B. & Br.). An account of the *Nectriæ* parasitic on scale insects is in course of preparation.

Nectria dealbata B. & Br.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 1029, as " Cæspitosa ; peritheciis carneis, materie alba velata, collabentibus ; ascis linearibus ; sporidiis oblongis ellipticis uniseptatis. Sporidia 12·5–13 × 5–6·25 μ." The type specimen is Thwaites 646.

The perithecia are about 0·3 mm. diameter, globose, collapsing, crowded in pulvinate groups about 2 mm. diameter on a parenchymatous stroma. They are now pale grayish-yellow, with a minute conical ostiolum on a central dark area,

which in some cases appears almost black. The wall appears pruinose, its outer layer being composed of loosely interwoven, thick-walled, often irregular hyphæ, collected here and there into loose masses. The asci are cylindric, sessile, eight-spored, with obliquely uniseriate spores, about 50 × 6 μ. The spores are oval, hyaline, not, or slightly, constricted at the septum, sometimes attenuated towards one end, minutely rough, 9–13 × 4–5 μ.

The type specimen in Herb. Kew is too ripe to show asci, but they are evident in the co-type in Herb. Peradeniya. von Höhnel (Mitt. XIV., p. 20) writes that he was unable to confirm Starback's statement that the spores are rough; they are rough in the perithecium from the type examined by me.

Hypoxylon umbrinellum B. & Br.

This was described in Fungi of Ceylon, No. 1075, as " Late effusum; peritheciis minutis ovatis metulæformibusque umbrinellis materie furfuracea vestitis; ascis linearibus; sporis subellipticis, uniseptatis, demum echinulatis (No. 1111). On dead wood with Byssisedæ. Margin of the stroma often barren, as in *H. rubiginosum;* sporidia 12·5 by 6·25 μ." In Saccardo, I., p. 729, it was listed, with a query, as *Amphisphæria.*

In the co-type in Herb. Peradeniya the perithecia are quite separate from one another, but crowded side by side in a flat layer, with a slight basal layer of mycelium. They appear dark brown or blackish-brown, but the wall when mounted is yellow-brown to red-brown. They are ovoid, 0·3 mm. diameter, and 0·4 mm. high, with a papillate ostiolum, pruinose. The wall is composed of rather large thin-walled cells, and is rough with slightly projecting cells and small scattered warts. The asci are clavate, sessile, eight-spored, with obliquely uniseriate spores, 60–70 × 8 μ. The spores are elliptic to fusoid, ends obtuse, one-septate, occasionally constricted, pale brown, wall striate with coarse ridges which are often broken, 11–15 × 5–6 μ.

In Ann. Perad., VI., p. 345, this species was transferred to *Phæonectria.* Cooke, however, had previously discovered

that it was a *Nectria*, and had enumerated it under *Byssonectria*, subgenus *Hyphonectria*, in Grevillea, XII., p. 109. From the specimens available it is doubtful whether the mycelium belongs to the *Nectria*. The species would appear to stand best as *Cosmospora*.

Nectria Dorcas (B. & Br.) Cooke.

This species was described by Berkeley and Broome in Fungi of Ceylon, No. 944, as "*Peziza* (*Dasycyphæ*) *Dorcas* B. & Br. Sessilis, globosa, aperta, extus cervina tomentosa; hymenio fusco; sporidiis subellipticis, medio constrictis, biseriatis uniseptatis binucleatis (No. 275). On some monocotyledonous plant, scattered over the bark, looking at first much like a villous *Sphæria*. Sporidia 12·5 μ long." It was included in Saccardo as *Solenopezia*. Cooke, in Grevillea, XII. (1884), p. 82, re-described it as "*Dialonectria Dorcas*. Superficialis, sparsa, globosa, demum collapsa et cupulæformis. Peritheciis extus cervino-tomentosis. Ostiolo fusco. Sporidiis subellipticis, medio constrictis, biseriatis, uniseptatis, hyalinis, 12 × 4·5 μ." Massee, in Journal of Botany, XXXIV. (1896) refers to it as *Peziza*.

The perithecia are yellowish-brown to fawn-coloured, globose, 0·3 mm. diameter, scattered or clustered. When dry the centre collapses. They are densely clothed with interwoven hyphæ, hyaline or brownish in colour, with free spreading ends, nodular above, up to 30 × 4 μ. The asci are clavate, eight-spored, spores biseriate, 80 × 12 μ, furnished with slender paraphyses. The spores are oblong-oval, ends rounded, one-septate, not constricted at the septum, 12–16 × 5 μ, wall faintly striate. In Saccardo's classification this is *Lasionectria*; it is included in the section *Lasionectria* in Saccardo, IX., p. 970.

Nectriella gigaspora Cke. & Mass.

This species was found by Cooke and Massee among the Ceylon specimens in Berkeley's herbarium, and was described by them in Grevillea, XVII., p. 42, as "Gregaria vel sparsa. Peritheciis minutis, aurantiis, pyriformibus vel ellipticis, glabris; ostiolo conico. Ascis lanceolatis, 150 μ long,

octosporis. Sporidiis elliptico-lanceolatis, continuis, granulosis, hyalinis, 30–33 × 10 μ. On *Botryosphæria inflata*, Habgalla, Ceylon 5:2)." I was unable to find *Nectriella gigaspora* on the type of *Botryosphæria inflata* in Herb. Kew, but there are specimens in Herb. Peradeniya, Thwaites 1107, sub *Nectria suffulta*.

The perithecia are about 0·4 mm. diameter, collapsed, dark red, pruinose, with a thin wall of rather large, thick-walled cells, up to 14 μ broad. They are solitary, or in small groups on an erumpent stroma. The Peradeniya specimens are too old to show complete asci. The spores are oval, thick-walled, verrucose, pale yellow, continuous, 34–54 × 15–28 μ. It appears to be parasitic on a *Sphæria*. According to modern classification, this must be known as *Pseudonectria gigaspora*.

Nectria fenestrata Berk. & Curt.

As previously stated in Ann. Perad., VI., p. 172, this species was described by Cooke in Grevillea, XII., p. 81, from specimens in Berkeley's herbarium. In the cover of this species in Herb. Kew there is a drawing, marked Ceylon 28, which bears a note in Berkeley's handwriting: "A *Nectria* mixed with *Sphærostilbe*." There is an abundance of specimens, which are Thwaites No. 48. On the same sheet is a specimen from Canada, labelled "*Sphærostilbe pseudotrichia*, *Nectria fenestrata*." The specimens are *Megalonectria pseudotrichia* Schw., and 28 and 48 are the Thwaites's numbers recorded by Berkeley and Broome for that species. Apparently Berkeley discovered that his *Nectria fenestrata* was *Megalonectria pseudotrichia*, and did not publish the former name.

Nectria myriadea Ces.

This species was collected by Beccari and described by Cesati. The description is "Perithecia minutissima, conferta, ovata, demum collapsa, pallide aurantia, tenuiter granulosa. Asci lineares, 0018 longi. Sporidia oblique monosticha, naviculæformia, continua, 1-guttulata, 5 × 3. Secundum mensuram Cookii = 016 × 008. Ad lignum nudum." It was included in Saccardo, II., p. 450, as *Nectriella*, the length of the ascus being given as 54 μ. Cesati's unit was 2 μ; hence

his measurement of the spore is 10 × 6 μ, while Cooke's is in millimetres, and is consequently 16 × 8 μ. The ascus measurement is not in accordance with Cesati's declared practice, and would appear to be in decimals of an inch, following the example of Berkeley and Broome.

Cooke, in Grevillea, XII., p. 110, referred this species to *Cosmospora* (as a subgenus).

There is a specimen from Cesati in Herb. Kew. The perithecia are scattered or crowded, superficial, without a stroma, ovoid, about 0·25 mm. diameter, collapsing, orange-red, pruinose. The perithecial wall is composed of large cells, about 10 μ diameter, and bears loosely-built, small warts of large cells, or scattered isolated projecting cells. The asci are eight-spored, cylindric, with spores uniseriate or obliquely uniseriate, 90–110 × 8–10 μ. The spores are oval, one-septate, not constricted at the septum, ends obtuse or subacute, brown, coarsely verrucose with warts and short ridges arranged in longitudinal lines, 10–16 × 5–8 μ.

Cooke's reference to *Cosmospora* is consequently correct.

Nectria tabacina Ces.

This species was collected in Ceylon by Beccari and described by Cesati. The description is " Perithecia minutissima, conferta, obovata, ostiolo acuto, demum fusco-ochracea, collapsa. Asci nulli adsunt, sed tantum sporidia oblonga, 00025, obscure septata ?, hyalina. Ad Polypori ? frustula. *Nectriæ pezizæ* haud dissimilis. Vix *N. suffulta* B. & Br." Cooke, in Grevillea, XII., p. 110, included it under *Eu-dialonectria* without comment. There is a specimen from Cesati in Herb. Kew. It is listed in Saccardo as *Nectria*, the spores being given as 25 μ long.

In the specimen in Herb. Kew the host is not a fungus, but the wall of some fruit, apparently a mangosteen (*Garcinia mangostana*). The perithecia are superficial, gregarious, about 0·4 mm. diameter, dark red, pruinose with yellow granules, globose, with a conical ostiolum, collapsing. The perithecial wall is composed of large thin-walled cells, tangentially elongated and circularly arranged round the ostiolum. Among the perithecia are a few dark red, stout hyphæ (?) up

to 16 μ in diameter. Asci were not found. The spores are narrow-oval, ends obtuse, yellow, 12–16 × 5–7 μ, with a mucilaginous coat ; they are continuous, but sometimes appear septate owing to a separation of the cell contents.

On the available specimens this species must be referred to *Pseudonectria.*

Nectria confusa v. H.

This species was found by von Höhnel, included in the type of *Nectria subquaternata* in Herb. Kew, and was described by him in Mitt. XIV. p. 34. It is included in Thwaites 173 in Herb. Peradeniya.

The perithecia in the type are situated in small, flat groups on a weakly-developed erumpent stroma. They are now white, or pale yellowish, oval, about 0·25 mm. diameter, with from three to five large warts or segments near the apex, which extend horizontally round the ostiolum. These warts are up to 120 μ long and 80 μ broad, and consist of rather small thick-walled cells. The asci are clavate, sessile, eight-spored, 66–80 × 12 μ. The spores are oval to subfusoid, not constricted, faintly longitudinally striate, 19–22 × 7–10 μ.

In a recent gathering from Hakgala, No. 4440 in Herb.,Peradeniya, the perithecia were pale red, or orange-red, when fresh becoming orange yellow when dry. They are subtranslucent, and are gregarious on an erumpent, subtranslucent, horny-looking stroma. The warts are composed of large, thick-walled, rounded cells, the wall being usually unequally thickened, and sometimes 6 μ thick on one side. The spores are smaller than in the type, measuring 13–16 × 6–7 μ.

Systematic List.

Hyponectria.

Hyponectria Memecyli Petch, Ann. Perad., VI., p. 328 ; *Sphæria* (*Obturatæ*) *Chionanthi* B. & Br., Fungi of Ceylon, No. 1114 ; *Didymella Chionanthi* (B. & Br.) Sacc., Syll. Fung., I., p. 549 ; *Sphærella Chionanthi* (B. & Br.) Cooke, Jour. Bot., 1883, p. 107.

Hyponectria Embeliæ Petch, Ann. Perad., VI.. p. 228.

PSEUDONECTRIA.

Pseudonectria gigaspora (Cooke & Mass.) Petch ; *Dialonectria* (*Nectriella*) *gigaspora* Cooke & Mass., Grevillea, XVII., p. 42 ; *Nectriella gigaspora* Cke. & Mass., Saccardo, Syll. Fung., IX., p. 942.

Pseudonectria tabacina (Ces.) Petch ; *Nectria tabacina* Ces., Myceti in itinere Borneensi, p. 15 ; *Dialonectria* (*Eu-dialonectria*) *tabacina* (Ces.) Cooke, Grevillea, XII., p. 110.

MELANOSPORA.

Melanospora parasitica Tul.

NEOCOSMOSPORA.

Neocosmospora vasinfecta Sm.

NECTRIA.

(1) *Eunectria.*

Nectria bactridioides B. & Br., Fungi of Ceylon, No. 1010 · *Nectria* (*Metanectria*) *bactridioides* (B. & Br.) Cooke, Grevillea, XII., p. 107.

Nectria stenospora B. & Br., Fungi of Ceylon, No. 1011 ; *Nectria* (*Metanectria*) *stenospora* (B. & Br.) Cooke, Grevillea, XII., p. 107.

Nectria bicolor B. & Br., Fungi of Ceylon, No. 1023 ; *Nectria* (*Metanectria*) *bicolor* (B. & C.) Cooke, Grevillea, XII., p. 107.

Nectria striatospora Zimm. ; *Nectria sanguinea* in B. & Br., Fungi of Ceylon, No. 1017 (in part) ; *Nectria cinnabarina* in B. & Br., Fungi of Ceylon, No. 1022 (in part).

Perithecia usually crowded, in groups up to 5 mm. diameter, on an erumpent stroma, globose, 0·4 mm. diameter, with a broad discoid apex, 0·15 mm. diameter, 0·05 mm. high, flat or broadly conical on the upper surface, blood red, becoming dark red, apex dark red, appearing almost black, smooth or slightly pruinose ; wall of the perithecium orange when mounted, of large cells, a few of which sometimes project, somewhat amorphous exteriorly. Asci clavate,

eight-spored, spores obliquely uniseriate or biseriate, 90 × 13–18 μ. Spores oval or subcymbiform, ends rounded, one-septate, not constricted at the septum, wall distinctly longitudinally striate, 18–34 × 8–13 μ.

This species is common in Ceylon. It was included in Thwaites's collections, but was assigned by Berkeley and Broome to *Nectria sanguinea*, *ex* Thwaites 29, and *Nectria cinnabarina*, *ex* Thwaites 1102.

According to von Höhnel and Weese (Ann. Myc., IX., p. 423), *Nectria striatospora* Zimm. = *Nectria discophora* Mont.

Nectria lucida v. Höhnel. Perithecia usually in clusters in small numbers on a feebly developed stroma, or often occurring singly, globose, or ovoid, 0·35 mm. diameter, with a small flat, not elevated, apical disc, and a minute conical ostiolum, glabrous, blood red, becoming dark red, darkening especially at the ostiolum and round the margin of the apical disc. Wall of the perithecium almost opaque when mounted. Asci cylindric, eight-spored, 70–100 × 6–8 μ. Spores oval or cymbiform, ends obtuse, one-septate, not, or slightly, constricted at the septum, hyaline, 10–16 × 5–7 μ.

Common at Hakgala, especially on *Acacia*.

(2) *Dialonectria*.

Nectria Bambusæ B. & Br., Fungi of Ceylon, No. 1015; *Nectriella Bambusæ* (B. & Br.) Sacc., Syll. Fung., II., p. 450; *Dialonectria* (*Nectriella*) *Bambusæ* (B. & Br.) Cooke, Grevillea, XII., p. 109; *Pseudonectria Bambusæ* (B. & Br.) v. H., Mitt. XIV., p. 16.

Nectria discoidea n. sp. Perithecia scattered, superficial, pale brown, opaque, collapsing and becoming discoid, 0·2 mm. diameter, depressed in the centre, smooth. Wall thin, composed of large, thick-walled cells up to 12 μ broad, pale brown by transmitted light. Ostiolum not projecting. Asci clavate, eight-spored, spores obliquely uniseriate, or biseriate, 35–45 × 6–8 μ. Spores hyaline, narrow-oval, ends obtuse, one-septate, not constricted at the septum, smooth, 10–14 × 3·5–4 μ. On a decaying *Xylaria*, Hakgala, May, 1913; No. 4577 in Herb. Peradeniya.

Nectria bomba n. sp. Perithecia scattered or crowded, without a stroma, globose, up to 0·3 mm. diameter, not collapsing, bright red, opaque, very minutely rugose, sometimes with a few minute yellow granules; ostiolum conical, on a darker red area, becoming almost black. Wall thick, of rather large cells, up to 12 μ diameter below, becoming more or less opaque and obscure above. Asci at first subcylindric, truncate at the apex, eight-spored, spores obliquely uniseriate, about 80 × 8 μ. Asci and paraphyses soon diffluent and emerging in a jelly-like mass when the perithecium is compressed. Spores oval to cymbiform, not, or slightly, constricted, ends obtuse, 10–16 × 4·5–6 μ. On a dead *Hevea* log, Peradeniya, October, 1919; No. 6122 in Herb. Peradeniya.

(3) *Lepidonectria.*

Nectria hæmatococca B. & Br., Fungi of Ceylon, No. 1018; *Nectria* (*Dialonectria*) *hæmatococca* (B. & Br.) Sacc., Syll. Fung., II., p. 496; *Dialonectria* (*Eu-dialonectria*) *hæmatococca* (B. & Br.) Cooke, Grevillea, XII., p. 110; *Nectria* (*Lepidonectria*) *luteococcinea* v. H., Mitt. XIV., p. 30; *Nectria diversispora* Petch, Ann. Perad., III., p. 4; *Nectria cancri* Rutgers, Ann. Jard. Bot. Buitenzorg, Ser. 2, XII., pp. 59–64 (from the description).

Nectria subquaternata B. & Br., Fungi of Ceylon, No. 1026; *Nectria* (*Lepidonectria*) *subquaternata* (B. & Br.) Cooke, Grevillea, XII., p. 107.

Nectria confusa v. H., Mitt. XIV., p. 34; *Nectria subquaternata* B. & Br., in part, in Fungi of Ceylon, No. 1026.

Nectria dealbata B. & Br., Fungi of Ceylon, No. 1029; *Nectria* (*Lepidonectria*) *dealbata* (B. & Br.) Sacc., Syll. Fung., II., p. 504; *Nectria* (*Lepidonectria*) *dealbata* (B. & R.) Cooke, Grevillea, XII., p. 107.

Nectria Berkeleyi v. H., Mitt. XIV., p. 17; *Nectria pityrodes* Mont., var. *saccharina* B. & Br., in Fungi of Ceylon, No. 1027.

Nectria pulcherrima B. & Br., Fungi of Ceylon, No. 1021; *Calonectria pulcherrima* (B. & Br.) Sacc., Michelia, I., p. 315; *Nectria* (*Lepidonectria*) *pulcherrima* (B. & Br.) Cooke, Grevillea, XII., p. 107.

? **Nectria ostiolorum** Berk. & Cooke. Perithecia scattered, superficial, globose, 0·2 mm. diameter, orange yellow, amber-coloured when dry, subtranslucent, more or less pruinose with scattered, projecting, or adherent, cells. Wall hyaline by transmitted light, of rather large cells up to 12 μ broad. Ostiolum minute, conical. Asci clavate, eight-spored, spores uniseriate, obliquely uniseriate, or biseriate, 40–50 × 6–8 μ. Spores oval, hyaline, one-septate, not constricted at the septum, minutely verrucose, 8–13 × 4 μ. On a decaying *Xylaria*, Hakgala, April, 1912 ; No. 3542 in Herb. Peradeniya.

The specimen distributed in Baker, Fungi Malayana, No. 166, Supplement, as *Nectria episphæria* (Tode) Fr., on *Eutypella heteracantha* on *Citrus decumana* (det. Saccardo) is this species in the set in Herb. Peradeniya. It differs completely from *Nectria episphæria* as described by Seaver in Mycologia, I., p. 65.

I have placed this species provisionally under *Nectria ostiolorum* Berk. & Cooke. It agrees with their brief description, except that the perithecia are not notably " Ostiolo pertuso " ; the latter character might, however, be due to age.

(4) *Hyphonectria.*

Nectria byssicola B. & Br., Fungi of Ceylon, No. 1025 ; *Byssonectria* (*Hyphonectria*) *byssiseda* (B. &. Br.) Cooke, Grevillea, XII., p. 109.

Nectria albofulta n. sp. Perithecia globose, or broadly conoid, scattered or in small groups on a well-developed, white, byssoid subiculum, minute, 0·15 mm. diameter, yellowish-red to blood red, translucent, very minutely rough ; ostiolum minute, conical. Wall of perithecium thin, composed of large cells, the external cells sometimes produced into conical processes up to 30 μ high. Asci clavate, scarcely pedicelled, eight-spored, 45–50 × 7–8 μ. Spores narrow-oval to subfusoid, one-septate, slightly constricted at the septum, ends obtuse, 9–11 × 3–4·5 μ. On dead stems of *Beloperone oblongata*, Peradeniya, February, 1917 ; No. 4958 in Herb. Peradeniya

(5) *Lasionectria.*

Nectria flavolanata B. & Br., Fungi of Ceylon, No. 1008; *Byssonectria* (*Hyphonectria*) *flavolanata* (B. & Br.) Cooke, Grevillea, XII., p. 109; *Nectria flocculenta* (H. & N.) v. H., Mitt. XIV., p. 31.

Nectria Dorcas (B. & Br.) Cooke; *Peziza* (*Dasycyphæ*) *Dorcas* B. & Br., Fungi of Ceylon, No. 944; *Dialonectria Dorcas* (B. & Br.) Cooke, Grevillea, XII., p. 82; *Lasionectria Dorcas* (B. & Br.) Cooke, Grevillea, XII., p. 112; *Peziza Dorcas* B. & Br., Massee, Jour. Botany, XXXIV. (1896), p. 146; *Nectria Dorcas* (B. & Br.) Cooke, Petch, Ann. Perad., VI., p. 171.

Nectria sulcispora n. sp. Perithecia scattered, superficial, broadly conoid, 0·2 mm. diameter, 0·15 mm. high, not collapsing, ostiolum papillate, dark yellow-brown, densely clothed up to the ostiolum with slender white hyphæ in floccose masses. Wall pale brown by transmitted light, of rather small, thick-walled cells. Asci clavate, eight-spored, spores obliquely uniseriate or biseriate, 50–60 × 10–12 μ. Spores oval, hyaline, one-septate, not constricted, obliquely longitudinally ridged, 10–13 × 4–6 μ. On a decaying *Xylaria*, Hakgala, May, 1913; No. 4577A in Herb. Peradeniya.

(6) *Cosmospora.*

Nectria fuliginosa B. & Br., Fungi of Ceylon, No. 1019; *Nectria* (*Dialonectria*) *fuliginosa* B. & Br., Sacc., Syll. Fung., II., p. 496; *Dialonectria* (*Cosmospora*) *fuliginosa* (B. & Br.) Cooke, Grevillea, XII., p. 110.

Nectria myriadea Ces.; *Nectriella myriadea* (Ces.) Sacc., Syll. Fung., II., p. 450; *Dialonectria* (*Cosmospora*) *myriadea* (Ces.) Cooke, Grevillea, XII., p. 110.

Nectria umbrinella (B & Br.) Cooke; *Hypoxylon umbrinellum* B. & Br., Fungi of Ceylon, No. 1075; *Amphisphæria*? *umbrinella* (B. & Br.) Sacc., Syll. Fung., I., p. 729; *Byssonectria* (*Hyphonectria*) *umbrinella* (B. & Br.) Cooke, Grevillea, XII., p. 109; *Phæonectria umbrinella* (B. & Br.) Petch, Ann. Perad., VI., p. 344.

Nectria (Cosmospora) Rickii Rehm. This species occurs at all elevations on decaying *Ustulina zonata* Lev.

The perithecia are superficial, scattered or gregarious, conoid, rounded below, up to 0·15 mm. diameter and 0·2 mm. high, blood red to orange red, smooth, shining. The wall, by transmitted light, is red-brown or yellow-brown, yellow round the ostiolum, and somewhat amorphous. The asci are cylindric, not pedicellate, with a truncate apex, which at first is thickened, 50–70 × 4–6 μ, spores uniseriate or obliquely uniseriate. Linear paraphyses are present. The spores are oblong-oval, with rounded ends, one-septate, constricted at the septum, strongly verrucose, pale brown, 7–9 × 3–4 μ.

(7) *Neohenningsia.*

Nectria confluens n. sp. (see p. 114) ; *Nectria suffulta* B. & C. (in part), in B. & Br., Fungi of Ceylon, No. 1020.

Dubia.

Nectria villigera B. & Br.

Excludendæ.

Nectria coccinea Fr.
Nectria Peziza Fr.
Nectria sanguinea Fr.
Nectria cinnabarina Fr.
Nectria fenestrata Cooke = *Megalonectria pseudotrichia* (Schw.).
Nectria pityrodes Mont.
Nectria gyrosa B. & Br. = *Endothia tropicalis* Shear & Stevens.

BRESADOLELLA.

Bresadolella nigra n. sp. Perithecia black, scattered, on a compact, effused, white, or brownish-white, stroma, 0·15 mm. thick, which extends over several centimetres. Perithecia globose, 66–100 μ diameter, or depresso-globose, 100 μ diameter, 70 μ high ; wall parenchymatous, fuscous, bearing a few scattered black-brown conical setæ 34 μ long, 7 μ diameter at the base, with acute tips ; ostiolum obtuse or slightly papillate. Asci cylindric 30–34 × 3 μ, becoming clavate and 6 μ broad, eight-, then sixteen-spored. Spores

oval, one-septate, constricted at the septum, ends obtuse, 5 × 2.5 μ, dividing in the ascus into globose, slightly rough, hyaline part-spores, 2–3 μ diameter, usually arranged in two rows. Hakgala, April, 1919; No. 5969 in Herb. Peradeniya.

The basal layer contains what are apparently aborted perithecial cavities, and is probably a *Hypocrea*, on which the *Bresadolella* is parasitic.

Sphærostilbe.

Sphærostilbe repens B. & Br., Fungi of Ceylon, No. 1005.

Sphærostilbe variabilis B. & Br., Fungi of Ceylon, No. 1006.

Sphærostilbe aurantiicola (B. & Br.) Petch; *Nectria aurantiicola* B. & Br., Fungi of Ceylon, No. 1023; *Nectria* (*Metanectria*) *aurantiicola* (B. & Br.) Cooke, Grevillea, XII., p. 107; *Corallomyces aurantiicola* (B. & Br.) v. Höhnel, Mitt. XIV., p. 14.

Sphærostilbe coccidophthora (Zimm.) Petch.

Dubia.

Sphærostilbe incerta Ces.

Excludenda.

Sphærostilbe gracilipes Tul.

Hypocrea.

(*a*) *Spores hyaline.*

Hypocrea pezizoides B. & Br., Fungi of Ceylon, No. 988.

Hypocrea jecorina B. & Br., Fungi of Ceylon, No. 989; *Hypocrea gelatinosa* var. *umbrina* Ces.; *Hypocrea umbrina* Cooke.

Hypocrea gigantea n. sp. Stromata irregularly globose or laterally ovoid, up to 4 cm. long, 3 cm. broad, and 3 cm. high, plicate at the sides and contracted below to a small area of attachment, often clustered, sometimes pulvinate with a flat plicate base, centrally attached, buff or pinkish-buff, glabrous, opaque; ostiola pale brown, inconspicuous, not projecting; internally white, radially fibrillose, the

outer perithecial layer separating readily from the context. Perithecia crowded in a distinct peripheral zone, vertically oval, up to 0·4 mm. high, 0·25 mm. diameter, wall hyaline. Asci cylindric, 70 × 4 μ, eight-, then sixteen-spored. Part-spores globose, 3–4 μ diameter, or oval 4–5 × 3–3·5 μ, hyaline, faintly warted, No. 2361, Peradeniya, 1907; No. 4881, Henaratgoda, July, 1916; No. 6032, Waga, March, 1917.

Hypocrea brunnea n. sp. Stromata circular, irregularly pulvinate, up to 1·2 mm. diameter and 0·6 mm. high, pale red-brown, uniformly coloured, glabrous, not translucent, ostiola not evident, perithecial elevations distinct; internally white, friable. Perithecia globose, 0·2 mm. diameter, wall hyaline or pale yellowish. Asci 96 × 5 μ. Part-spores globose, 3·5–5 μ diameter, or cuboid, 4 × 3 μ, spinulose, hyaline; extruded spores white in mass. On dead wood, Hakgala, April, 1919; No. 6008 in Herb. Peradeniya.

Somewhat resembles *Hypocrea discella*, but has inconspicuous ostiola, larger spores, and a pale perithecial wall. In *Hypocrea discella* the spores are distinctly greenish-yellow.

Hypocrea confusa n. sp. (see p. 94); *Hypocrea rufa* Fr., in B. & Br., Fungi of Ceylon, No. 991.

Hypocrea albofulva B. & Br., Fungi of Ceylon, No. 996.

Hypocrea straminea n. sp. (see p. 97); *Hypocrea citrina* Fr., in B. & Br., Fungi of Ceylon, No. 997.

Hypocrea extensa n. sp. Stromata circular, up to 1 cm. diameter, or confluent in irregular patches extending over several centimetres, plane, thin, about 0·3 mm. thick, pale yellow, densely covered with brown ostiola, glabrous, opaque, even; margin definite, not byssoid, recurved when dry; internally white, with a yellow cortical layer. Perithecia globose, up to 0·1 mm. diameter, or flask-shaped, crowded, wall yellow. Asci, sporiferous part, 42–56 × 3–4 μ, eight-, then sixteen-spored. Part-spores globose, hyaline, faintly warted, 2·5–3 μ diameter. On a dead branch, Peradeniya, January, 1912; No. 3419 in Herb. Peradeniya.

(*b*) *Spores coloured, green to greenish-yellow.*

Hypocrea catoptron B. & Br., Fungi of Ceylon, No. 990.

Hypocrea palmicola B. & Br., Fungi of Ceylon, No. 994; *Hypocrea lenta* Fr., in B. & Br., Fungi of Ceylon, No. 992.

Hypocrea chlorostoma n. sp. Stromata discoid, upper surface slightly convex, even, up to 4 mm. diameter and 0·5 mm. thick, margin rounded, yellow-brown, then sordid brown, with dark green ostiola, internally yellowish-white, not translucent; when dry (herbarium specimens) becoming rugose, dark red-brown, ostiola not evident, or blackish-green above and red-brown at the sides, and blackish-green internally. Perithecia globose, 0·1–0·15 mm. diameter, or laterally oval, 0·18 mm. diameter, 0·1 mm. high, deeply sunk in about the middle of the stroma; perithecial wall greenish-yellow when fresh, yellow-brown in herbarium specimens. Asci, eight-, then sixteen-spored, 60–64 × 4 μ. Spores light green when fresh, blackish-green in herbarium specimens, verrucose, generally globose, 3·5–4 μ, some oval, 4 × 3 μ. On dead wood, Peradeniya, September, 1914; No 4109 in Herb. Peradeniya.

Hypocrea mellea n. sp. Stromata subtranslucent, pale yellow-brown or honey coloured with brown ostiola when fresh, becoming red-brown with blackish ostiola when dry, pulvinate, up to 4 mm. diameter, margin rounded, attached over nearly the whole base or over a central area about half the diameter of the base; surface even, sometimes becoming rugose in drying. Internally pale yellow and fleshy when fresh, yellowish-white and corky, or sometimes friable, when dry. Perithecia usually vertically oval, up to 0·3 mm. high, 0·1–0·15 mm. diameter, sometimes globose, 0·2 mm. diameter, situated at varying depths; perithecial wall yellow-brown. Asci 65–75 × 4 μ. Part-spores oval 5–6 × 4 μ, or globose 4–5 μ diameter, spinulose, yellow or greenish-yellow; extruded spore masses yellow. Hakgala, September, 1908; No. 3006 in Herb. Peradeniya.

This species resembles the one attributed to *Hypocrea rufa* by Berkeley and Broome, but differs in having its perithecia situated at different depths, its yellow spores, and the absence of a white edge in the young stromata.

Hypocrea discella B. & Br., Fungi of Ceylon, No. 984.

Hypocrea deplanata B. & Br., Fungi of Ceylon, No. 985.

Dubiæ.

Hypocrea artocreas B. & Br., Fungi of Ceylon, No. 983.

Hypocrea saccharina var. *agaricicola* B. & Br., Fungi of Ceylon, No. 987.

Excludendæ.

Hypocrea Bambusæ B. & Br., Fungi of Ceylon, No. 999.= *Balansia Bambusæ* (B. & Br.) Petch, Ann. Perad., VI., p. 170.

Hypocrea discoidea B. & Br., Fungi of Ceylon, No. 998 = *Hypocrella discoidea* (B. & Br.) Sacc., Michelia, I., p. 322.

Hypocrea multiformis B. & Br., Fungi of Ceylon, No. 995.

Hypocrea citrina Fr.

Hypocrea rufa Fr.

Hypocrea umbrina Cooke = *Hypocrea jecorina* B. & Br.

Hypocrea lenta Fr.

CLINTONIELLA.

Clintoniella fusigera (B. & Br.), comb. nov. ; *Hypocrea fusigera* B. & Br., Fungi of Ceylon, No. 993.

Clintoniella corticioides (B. & Br.), comb. nov. ; *Hypocrea corticioides* B. & Br., Fungi of Ceylon, No. 986.

PODOCREA.

Podocrea zeylanica Petch, Ann. Perad., VI., p. 230.

HYPOMYCES.

Hypomyces pæonius B. & Br., Fungi of Ceylon, No. 1000.

Hypomyces chrysostomus B. & Br., Fungi of Ceylon, No. 1001.

Hypomyces chromaticus B. & Br., Fungi of Ceylon, No. 1002.

Hypomyces flavolanatus Petch, Ann. Perad., VI., p. 229.

Hypomyces pallidus n. sp. On decaying agarics. Mycelium white, compact, filling the interstices between the gills, and converting the pileus into a solid mass with radial ribs.

Conidiophores verticillioid, up to 150 μ high, 4 μ diameter below, septate; conidia not seen. Perithecia immersed, ostiola projecting, sometimes subsuperficial, hyaline, globose or ovoid, up to 0·4 mm. high, 0·2 mm. diameter; ostiolum papillæform. Asci cylindric, eight-spored, spores uniseriate or obliquely uniseriate, 100–110 × 6 μ. Spores narrow-oval, inequilateral, or fusoid, hyaline, white in mass, one-septate, not, or slightly, constricted, minutely spinulose, ends obtuse without solid tips, 9–13 × 3–4 μ. Deviturai, August, 1917; No. 5338 in Herb. Peradeniya.

NEOSKOFITZIA.

Neoskofitzia monilifera (B. & Br.) v. H., Mitt. XIV., p. 38; *Nectria monilifera* B. & Br., Fungi of Ceylon, No. 1007; *Nectriella monilifera* (B. & Br.) Sacc., Michelia, I., p. 279; *Dialonectria* (*Eu-dialonectria*) *monilifera* (B. & C.) Cooke, Grevillea, XII., p. 110; *Neoskofitzia termitum* v. H., Mitt. V., No. 169.

CALONECTRIA.

Calonectria rigidiuscula (B. & Br.) Sacc., Michelia, I., p. 313; *Nectria rigidiuscula* B. & Br., Fungi of Ceylon, No. 1024; *Nectria* (*Calonectria*) *rigidiuscula* B. & Br., Cooke, Grevillea, XII., p. 107; *Calonectria sulcata* Starb.; *Calonectria Meliæ* Zimm.

Calonectria volutella (B. & Br.) Sacc., Michelia, I., p. 309; *Nectria volutella* B. & Br., Fungi of Ceylon, No. 1013; *Lasionectria volutella* (B. & Br.) Cooke, Grevillea, XII., p. 112.

Calonectria oodes n. sp. Perithecia scattered, superficial, globose, 0·25 mm. diameter, collapsing when dry, subtranslucent, lemon-yellow to orange-yellow, sometimes glabrous, usually covered with hyaline rigid hairs, 20–50 μ long, 5 μ diameter, tapering upwards to the acute or obtuse apex, slightly encrusted, often irregularly bent; ostiolum minute, scarcely evident, a small pore about 10 μ diameter, furnished with periphyses; wall indistinctly parenchymatous, yielding large oil drops when crushed. Asci clavate, apex subacute, eight-spored, spores obliquely uniseriate, 70 ×

12 μ. No paraphyses. Spores hyaline, fusoid or narrow-oval, inequilateral, 5–7-septate, 18–29 × 5–6 μ. On a decaying stem, Peradeniya, June, 1919 ; No. 6009 in Herb. Peradeniya. At first sight appears astomate, and resembles a group of insect eggs.

Broomella.

Broomella niphidium (B. & Br.) Cooke, Grevillea, XII., p. 105 ; *Hypoxylon niphidium* B. &. Br., Fungi of Ceylon, No. 1067 ; *Melogramma niphidium* (B. & Br.) Sacc., Syll. Fung., II., p. 646 ; *Broomella niphidium* (B. & Br.) Petch, Ann. Perad., VI., p. 345.

Gibberella.

Gibberella rugosa n. sp. Perithecia solitary, or clustered in groups up to six, erumpent, without superficial stroma, sometimes with a slight whitish mycelium at the base, minute, 0·15 mm. diameter, ovoid or clavate, rough with prominent rounded warts, indigo or black, wall deep violet by transmitted light, ostiolum not elevated. Asci ovato-clavate, eight-spored, spores biseriate, 64–72 × 14–18 μ. Spores narrow-oval to subcymbiform, three-septate, not constricted at the septa, ends rounded, hyaline, 18–24 × 6–8 μ, exceptionally 32 × 8 μ. On dead twigs, Peradeniya, May, 1915 ; No. 4642 in Herb. Peradeniya.

Megalonectria.

Megalonectria pseudotrichia (Schw.) Speg. ; *Sphærostilbe pseudotrichia* Schw., in B. & Br., Fungi of Ceylon, No. 1004 ; *Nectria fenestrata* B. & C., in Cooke, Grevillea, XII., p. 81.

Ophionectria.

Ophionectria trichospora (B. & Br.) Sacc., Michelia, I., p. 323 ; *Nectria trichospora* B. & Br., Fungi of Ceylon, No. 1014 ; *Dialonectria* (*Ophionectria*) *trichospora* (B. & Br.) Cooke, Grevillea, XII., p. 111.

Ophionectria coccicola Ell. & Ev.

Micronectria.

Micronectria Eugeniæ n. sp. Spots yellow, dotted with black ostiola. Perithecia hypophyllous, immersed in the mesophyll, elevating the epidermis, but not erumpent, scattered, globose, or laterally oval, conical above, 0·15 mm. diameter; wall stout, yellow or brownish-yellow, becoming blackish-brown at the ostiolum. Asci oblongo-clavate, apex truncate, shortly pedicellate, eight-spored, 120 × 12 μ, spores in a parallel bundle, almost straight or spirally twisted. Paraphyses linear, sometimes inflated at the tips. Spores hyaline, linear, ends truncate, obscurely septate, 80–96 × 2 μ. On leaves of *Eugenia* sp., Hakgala, April, 1919; No. 5986 in Herb. Peradeniya.

Byssostilbe.

Byssostilbe stilbigera (B. & Br.) Petch, Ann. Perad., V., p. 296; *Hypomyces stilbiger* B. & Br., Fungi of Ceylon, No. 1003; *Berkelella stilbigera* (B. & Br.) Sacc., Syll. Fung., IX., p. 989; *Ophionectria Trichiæ* Penz. & Sacc., Icones Fungorum Javanicorum, p. 48, tab. 33, fig. 4.

Hypocrella.

Hypocrella discoidea (B. & Br.) Sacc.; *Hypocrea discoidea* B. & Br., Fungi of Ceylon, No. 998.

Hypocrella Raciborskii Zimm.

Hypocrella Mollii Koord.

Hypocrella Reineckiana Henn.

Hypocrella javanica (Penz. & Sacc.) Petch.

Hypocrella ceramichroa (B. & Br.) Petch; *Hypoxylon ceramichroum* B. & Br., Fungi of Ceylon, No. 1059; *Glaziella ceramichroa* (B. & Br.) Cooke, Grevillea, XI., p. 83.

Hypocrella oxystoma (Berk.) comb. nov.; *Aschersonia oxystoma* Berk., Hooker's Jour. of Bot., VI., p. 205.

Epichloe.

Epichloe cinerea B. & Br., Fungi of Ceylon, No. 982.

Claviceps.

An ergot occurs on *Paspalum sanguinale* Lam. at Peradeniya, and a *Sphacelia* on *Paspalum* sp. at Colombo. In the latter case, attention is drawn to the infected inflorescences by the numbers of flies which visit them.

Balansia.

Balansia brevis (B. & Br.) v. H., Mitt. XII., p. 63 ; *Ephelis brevis* B. & Br., Fungi of Ceylon, No. 800 ; *Ophiodothis brevis* (B. & Br.) Petch, Ann. Perad., IV., p. 431.

Balansia Bambusæ (B. & Br.) Petch, Ann. Perad., VI., p. 170 ; *Hypocrea Bambusæ* B. & Br., Fungi of Ceylon, No. 999 ; *Hypocrella Bambusæ* (B. & Br.) Sacc., Michelia, I., p. 323.

Balansiella.

Balansiella pulvinula (B. & Br.) Petch, Ann. Perad., VI., p. 172 ; *Epichloe pulvinulus* B. & Br., Fungi of Ceylon, No. 981 ; *Hypocrella pulvinula* (B. & Br.) Sacc., Syll. Fung., II., p. 581.

Bivonella.

Bivonella chrysomalla (B. & Br.) Sacc., Syll. Fung., IX., p. 990 ; *Melanospora chrysomalla* B. & Br., Fungi of Ceylon, No. 1125. Re-described Ann. Perad., IV., p. 436.

Recent Revisions of Ceylon Botany.

BY

T. PETCH, B.A., B.Sc.

THE following notes relating to Ceylon plants have been compiled for the information of Ceylon botanists from the papers cited. In some cases it has been possible to add a few further details.

(1) Blatter, E., and Hallberg, F. A Revision of the Indian Species of Rotala and Ammania. Jour. Bombay Nat. Hist. Soc., XXV., pp. 701–722.

Under *Rotala verticillaris* L. (p. 705), *Ammania Rotala* Clke. non Muell., the authors refer to a Ceylon specimen of this species in Herb. S. Kurz. [*Ammania Rotala*, in Flora of Ceylon, III., 224.—*Ed.*]

(2) Dunn, S. T. Notes on the Flora of Madras. Kew Bulletin, 1916, pp. 58–65.

The notes on *Cyclea Burmanni* should receive attention from Ceylon botanists.

Cardamine subumbellata Hook. is said to be identical with the earlier *Cardamine trichocarpa* Hochst. *Capparis stylosa* DC. is adopted for *C. divaricata* W. & A. [See Flora of Ceylon, I., p. 61 : the Ceylon plant is insufficiently known.—*Ed.*] *Capparis zeylanica* Linn. is considered identical with *Capparis horrida* Linn. f. ; the author's interpretation of the specimens in Herb. Hermann differs from that of Trimen. According to Dunn's conclusions, the *Capparis zeylanica* of the Flora of Ceylon will be *C. brevispina* DC., as in Thwaites Enum, 15, but he does not cite Ceylon specimens. *Bergia capensis* L. is restored for *B. verticillata* Willd. *Abutilon hirtum* G. Don has precedence of *A. graveolens* W. & A., and *A. glaucum* Cav. of *A. muticum* G. Don.

(3) Gamble, J. S. Decades Kewenses. Kew Bulletin, 1916, pp. 131–136.

The following species new to Ceylon is described (p. 134) :—

878. *Ventilago lanceolata* Gamble [Rhamnaceæ-Ventilagineæ] ; *V. maderaspatanæ* Gaertn., affinis, foliis oblongo-lanceolatis acuminatis, floribus minutis, ovario glabro et calycis tubo fructifero patelliformi basi nucis solum adnato differt.

Frutex scandens, ramulis teretibus glabris vel juventute puberulis tandem nigrescentibus. *Folia* oblongo-lanceolata, apice acuminata, mucronata, basi inæqualiter subrotundata, 6–10 cm. longa, 2–4 cm. lata, chartacea, præcipue apicem versus crenata, juniora subtus puberula, tandem glabra ; nervi laterales utrinsecus 6–8, marginem versus curvati et nervulis transversis permultis parallelis horizontalibus juncti. *Flores* minuti, in glomerulis parvis secus ramulos sinuatos panicularum axillarium vel lateralium fere sessiles. *Paniculæ* graciles, ferrugineo-villosæ, 2–7 cm. longæ, ramulis paucis vix 1 cm. longis ; bracteæ caducæ ; bracteolæ sub glomerulis plures lineares ; flores vix 2·5 mm. diametro. *Calyx* extra villosus, intus glaber. *Petala* minuta, lata, cucullata. *Stamina* fere sessilia, connectivo nigro apice recurvo. *Discus* glaber, complanatus. *Ovarium* glabrum ; styli 2, brevissimi. *Samara* circiter 5 cm. longa, oblanceolata, parce puberula reticulata, vix 1 cm. lata, juventute ferrugineo-tomentosa, nuce ad basin in calycis tubo persistente patelliforme insidenti.

South India. Kanota, Malabar District, Dec., 1913, C. A. Barber ; Tinnevelly Ghats, &c., 1873, Beddome.

Ceylon : Hantane ; at 600 m., Gardner 180 ; Walker 169.

(4) Gamble, J. S. Notes on the Flora of Madras. Kew Bulletin, 1918, pp. 222–228.

Under *Nothopegia* the author includes the following paragraph (p. 227) :—

" In his Flora Sylvatica of South India and Ceylon, Beddome gives Blume's description of *Nothopegia* (amplified to describe the flowers, &c.) and a Plate No. 164, drawn by Dr. Thwaites from a Ceylon specimen. Beddome's description and plate

are also quoted by Hooker and Engler under *N. Colebrookiana*. An examination of the plate, of Beddome's South Indian specimens and of Thwaites C. P. 1260, shows that the plant figured has oblong, long—but not always abruptly—acuminate thin leaves, to 5 in. long by 1 to 1·5 in. broad, very slender flower panicles, and a transversely oblong vertically more or less striate drupe with thin pericarp. It is quite unlike Wight's plant, and is distinct, in my opinion, from it. It differs less, perhaps, from *N. Dalzellii*, but the thin narrow leaves, nearly glabrous inflorescence, and striate fruit separate it, and I propose to call it *N. Beddomei*."

(5) Hill, A. W. The genus Strychnos in India and the East. Kew Bulletin, Nos. 4 and 5, 1917.

This thorough revision of the genus *Strychnos* in India and the East effects several changes in the nomenclature of the Ceylon species, and the number of Ceylon species is raised from seven to nine, three new names being proposed. The plant hitherto known as *S. colubrina* var. *zeylanica* is made a different species under the name *S. trichocalyx*, a plant included by Thwaites under S. *micrantha* is separated as *S. tetragona*, and another as *S. lenticellata*, while *S. coriacea* Thw. is restored.

Hill's remarks on the relationships and distribution of the Ceylon species of *Strychnos* are of interest.

"The Flora of Ceylon has recently been examined with regard to its endemic constituents, and as Trimen's Flora has been taken as the basis from which deductions have been drawn, it is worth while to inquire whether this re-investigation of the genus *Strychnos* affects the discussion to any extent.

"Trimen catalogues seven species, three of which he considers endemic in Ceylon; one of these three, however, *S. cinnamomifolia*, is represented in Travancore by so closely allied a variety that the plants from the two localities might almost be considered to be identical. Two varieties, *S. colubrina* var. *zeylanica* Clarke (= *S. trichocalyx* A. W. Hill), and *S. Beddomeii* var. *coriacea* (= *S. coriacea* Thw.), which he places with the plants common to India and Ceylon, have been wrongly assigned to their respective species by C. B. Clarke, and each is now found to be a good species.

" The re-examination of all the available material, which is by no means good, has resulted in the recognition of nine Sinhalese species of *Strychnos*, five of which are endemic. Two of these are represented in S. India by closely allied, but easily distinguished, species, and three appear to be peculiar to the Island.

" Particulars are set out in tabular form :—

Ceylon.	Southern India.	Andaman Islands.
Endemic Species.	*Representative Species.*	
S. Benthami Clarke and vars *S. coriacea* Thw. .. *S. tetragona* A. W. Hill ..	None	
S. micrantha Thw. ..	*S. colubrina* Linn. ..	—
S. trichocalyx A. W. Hill ..	*S. Dalzellii* Clarke ..	—
S. cinnamomifolia Thw. ..	*S. cinnamomifolia* Thw. var. *Wightii* A. W. Hill	*S. tubiflora* A. W. Hill

Species common to Ceylon and India :—

S. lenticellata A. W. Hill ..	*S. lenticellata* A. W. Hill	—
S. Nux-vomica Linn. ..	*S. Nux-vomica* Linn. ..	—
S. potatorum Linn. ..	*S. potatorum* Linn. ..	—

" Of the species common to Ceylon and India, three (*S. Nux-vomica*, *S. potatorum*, and *S. lenticellata*) are dry country plants, and their occurrence in the drier parts of Ceylon, which may be considered both from the physical and geographical standpoint to be part of India, is to be expected. *S. cinnamomifolia* is a moist country plant of the tropical forests, and occurs in India in the forests of Travancore, &c. Here, again, physical conditions are very similar, and the floras of the two regions show many species in common. It is interesting to notice that a species apparently closely allied to *S. cinnamomifolia* is found in the Andaman Islands, but it is sufficiently distinct to be raised to specific rank, and has been described under the name *S. tubiflora* A. W. Hill. There is also some evidence that *S. cinnamomifolia* may occur in the tropical forests of Silhet, and *S. Pierriana* A. W. Hill from Annam appears to be a very closely allied species.

"The species endemic in Ceylon are of interest. *S. micrantha* and its closely allied representative species *S. colubrina* inhabit moist low country somewhat similar to the habitat of *S. cinnamomifolia*. *S. trichocalyx*, and its Indian representative *S. Dalzellii*, appear to be somewhat dry country plants, judging from their general facies and their stout coriaceous leaves. In these two species the hairs on the inside of the calyx lobes are unique in the genus, at least as far as the eastern species are concerned. Of the three remaining endemic species, *S. Benthami*, with its 4-merous flowers, is quite a distinct species peculiar to Ceylon, and occurs, as might be expected, in the central and southern regions. *S. coriacea*, also peculiar, inhabits the Central Province, and *S. tetragona* is apparently a low-country plant. With its trinerved, closely-veined leaves and glabrous ovary the latter species shows some resemblance to *S. ænea* A. W. Hill from Travancore. The anthers, however, in the Ceylon plant are slightly bearded, and the resemblance between the two species may only be superficial. It has seemed desirable to refer to the Ceylon species of *Strychnos* in some detail since erroneous deductions might be drawn from the statements published in Trimen's Flora."

Hill divides his material in four groups: (1) *Brevitubæ*, with a very short corolla tube, (2) *Lanigeræ*, with the corolla provided with long woolly hairs at the throat; (3) *Penicillatæ*, differentiated by the occurrence of a line of erect bristle-like hairs either across the base or across the middle of the inner face of the corolla lobes; and (4) *Tubifloræ*, with an elongated, cylindrical corolla tube.

The key to the Ceylon species is as follows :—

Section I.—Brevitubæ.

Corolla tube short; lobes of the corolla longer than the tube, lobes and throat glabrous or woolly tomentose.

Corolla lobes 5; anthers hairy; ovary and style glabrous.

S. tetragona.

Section II.—Lanigeræ.

Corolla furnished with woolly hairs at the throat or towards the base of the lobes and in the upper part of the tube; lobes and tube more or less equal in length; anthers glabrous in Ceylon species.

Ovary glabrous ..	*S. potatorum*
Ovary tomentose ..	
Leaves trinerved :—	
Corolla tomentose externally.	*S. coriacea*
Corolla glabrous externally ..	*S. micrantha*
Leaves triplinerved ..	*S. lenticellata*

Section III.—Penicillatæ.

Lobes of the corolla furnished with a line of erect hairs.

Corolla lobes 4 ..	*S. Benthami*
Corolla lobes 5 ..	*S. trichocalyx*

Section IV.—Tubifloræ.

Corolla cylindric, elongated, with the tube much longer than the lobes.

Tree	*S. Nux-vomica*
Climber	*S. cinnamomifolia*

The following revised descriptions* of the Ceylon species are given :—

"**S. tetragona** A. W. Hill, species ramulis et pedunculis tetragonis, corolla campanulata tubo breve lobis repandis, antheris barbatis, ovario glabro distincta.

"*Frutex* ramis sulcatis in juventute tetragonis pubescentibus. *Folia* ovata vel obovato-elliptica, basi rotundata vel rotundato-cuneata, apice acute et longe acuminata, 6–9 cm. longa, 3–4 cm. lata, 5-nervia, superne vernicosa, nervis impressis, pagina inferiore nervis minute pubescentibus petioli circiter 5 mm. longi. *Inflorescentiæ* axillares, paniculatæ, 2·5–5 cm. longæ, pedunculis pedicellisque tetragonis sulcatis pubescentibus. *Calycis* segmenta triangulari-ovata, 0·75 mm. longa, plus minusve acuta, glabra, marginibus ciliatis. *Corolla* 3·5 mm.

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longa, lobis repandis circiter 2·5 mm. longis plurime et ad faucem pilis laneis dense instructis, tubo campanulato glabro. *Antheræ* circiter 1 mm. longæ, ovatæ, basi paullo barbatæ vel subglabræ, filamentis 0·75–1 mm. longis. *Ovarium* globosum, cum stylo glabrum 2·25 cm. longum. *Fructus* ignotus. *S. micrantha* Thwaites, Enum. Plant. Zeyl. Add., p. 425; C. B. Clarke in Hook. f., Flor. Brit. Ind. IV., p. 86; Trimen, Fl. Ceylon, Pt. III., p. 172, omnes quoad C. P. 3720 partim.

"Ceylon. Without precise locality, Thwaites 3720 B. in Herb. Kew.

"This plant, included by Thwaites under *S. micrantha*, is quite distinct from the other plants placed by him under that species. The pubescent twigs and the pubescent nerves on the under surfaces of the leaves, the short campanulate corolla tube, bearded anthers and glabrous ovary and style mark this plant as a well-defined species.

"There are two distinct plants at Kew bearing the original label *Thwaites* 3720, one of which is rightly referred by Thwaites (Enum., p. 425) to *S. micrantha*. It was originally labelled *S. laurina*, and is included by C. B. Clarke (Fl. Brit. Ind., IV., p. 88) under *S. Beddomei*. The other plant—the type of the new species—was also seen by Clarke and placed under *S. micrantha* (Fl. Brit. Ind., IV., p. 86), for he refers to the glabrous ovary of C. P. 3720, although Thwaites, in his description, states that the ovary in *S. micrantha* (Enum., p. 425) is villous. *S. micrantha*, according to Clarke, l. c., is represented by C. P. 3720 (B.) and C. P. 1866, the latter a doubtful fruiting specimen—while *S. micrantha* Thwaites, includes C. P. 3540, 3720 (A.), of which there are two sheets at Kew, and 1866. In order to reconcile his own conception of *S. micrantha*, Clarke has removed Nos. 3540 and 3720 (A), with the ovary hairy, to his *S. Beddomei*, which is here considered synonymous with *S. colubrina*, the South Indian species.

"It is unfortunate that we have no definite knowledge of where this endemic species was collected. Since it bears the same number as specimens belonging to *S. micrantha* Thw., it may perhaps be concluded that it is a native of the low-country (see Trimen, Flor. Ceylon, III., p. 172).

" In its leaf and floral characters it shows some resemblance to *S. æneca* A. W. Hill. It differs especially in the slightly bearded anthers, the pubescent stems, and larger paniculate inflorescences.

" **S. potatorum** Linn. f., Suppl., p. 148 ; descr. ampl.

" *Inflorescentiæ* axillares, pedunculis pedicellisque glabris. *Calyx* glaber. *Corolla* 6·5–7 mm. longa, lobis 3–3·5 mm. longis fauceque pilis sparsis instructis. *Antheræ* 1 mm. longæ, glabræ, filamentis 1·5–1·75 mm. longis in sinubus insertis. *Ovarium* cum stylo glabrum, 6 mm. longum ; G. Don, Dict., IV., p. 65 ; A. DC. in DC. Prodr., IX., p. 15 (lit. cit.) ; Wight, Illustr., II., t. 156 ; Benth. in Journ. Linn. Soc., I., 103 ; C. B. Clarke in Hook. f. Flor. Brit. Ind., IV., p. 90 (lit. cit.) ; Kurz, For. Flor. II., p. 167 ; Cooke, Fl. Bombay, II., p. 186 ; Dalz. and Gibs, Bombay Flora, p. 156 ; Wall. Fl. Ind., II., p. 263 ; Roxb., Fl. Ind., I., p. 576 ; Thwaites, Enum. Plant. Zeylan., p. 425 non p. 201 ; Trimen, Fl. Ceylon, Pt. III., p. 176 ; Brandis, Indian Trees, p. 474 ; Dop in Bull. Soc. Bot. Fr., LVII., Mém. 19 (1910), p. 18 ; Bourdillon, Forest Trees, Travancore, p. 270.

" Ceylon. Doonbera ; Trincomalee, *Glenie* C. P. 3719 ; without locality, Koenig in Herb. Mus. Brit.

" S. India. Deccan peninsula ; Mysore to Chotanagpur ; numerous collectors.

" Burma. Prome Hills, *Wallich* 1585 ; Pegu, Prome, Kurz 2320 ; Prome, Burkill 23819 in Herb. R. E. P.

" The inflorescences are borne at the end of short, leafy, axillary shoots. The long flowers resemble externally those of the long-tubed species, but the corolla lobes are almost equal in length to the tube. The mature leaves are quintuplinerved and easily recognized from those of any other Eastern species. Some specimens from Courtallum in Herb. Wight (1836, No. 639) at Glasgow have obovate leaves cuneate at the base, and the twigs are unusually slender. The tree is characteristic of the dry regions of India and Ceylon, and the only record of its occurrence in Burma is from the Prome Hills, where conditions resemble those of the drier parts of India. As the tree bears no native Burmese name, it seems possible that it may have been introduced from India.

"The Burma material is very poor, no flowers being present, but the seed appears to be rather larger than in the Indian specimens. Kurz's description also differs slightly from that given in the Flora of British India.

"**S. coriacea** Thwaites, Enum. Plant. Zeyl., p. 425; descr. ampl.

Frutex ramulis junioribus pubescentibus. *Folia* ovato— vel elliptico—lanceolata, acuta vel breviter acuminata, coriacea, 6–6·5 cm. longa, circiter 3 cm. lata, marginibus paullo reflexis, subtriplinervia, nervibus crassis, petiolis, 2 mm. longis hirsutis. *Inflorescentiæ* axillares, crassæ, 3·5–4 cm. longæ, pedunculis pedicellisque pubescentibus. *Calyx* 1·5 mm. longus; segmenta late ovata, subacuta, marginibus ciliatis. *Corolla* 6 mm. longa, externe puberula, lobis 3 mm. longis interne totius cum corolla ad faucem dense laneo-tomentosis, pilis longis intertextis, tubo glabro. *Antheræ* 1·25 mm. longæ, ellipticæ, glabræ, filamentis crassis 1·5 mm. longis. *Ovarium* cum stylo 4·5 mm. longum, pilis erectis instructum. *S. Beddomei* var. *coriacea* C. B. Clarke in Hook. f. Flor. Brit. Ind., IV., p. 89; Trimen, Fl. Ceylon, Pt. III., p. 173. *S. potatorum* Thwaites, Enum., p. 201 partim.

"Ceylon. Central Province, Thwaites 3,367.

"In its pubescent stems and petioles, leathery, shortly petioled, subtriplinerved leaves, puberulous corolla with lobes densely hairy from base to apex, this plant appears to be worthy of specific rank. I have therefore followed Thwaites and also prepared a more ample description. According to Trimen, its habitat is the Central Province of the Island, which suggests that it is a truly endemic species. It is unfortunate that it is represented at Kew and the British Museum by only single specimens, and that no fruits have been collected."

"**S. micrantha** Thwaites, Enum. Plant. Zeyl., p. 425 partim, C. P. 1866 excl.; C. B. Clarke in Hook. f. Fl. Brit. Ind., IV., p. 86 partim, sed ovarium hirsutum nec glabrum; Trimen, Fl. Ceylon, Pt. III., p. 172 partim, C. P. 1866 excl.; Dop in

Bull. Soc. Bot. Fr., LVII., Mém. 19 (1910), p. 14, var. excl. "*S. colubrina et S. Beddomei*, Brandis, Indian Trees, p. 474 partim, quoad spec. Zeylan. tantum. *S. laurina* Thwaites, Enum., p. 201. *S. Beddomei* Trimen, Fl. Ceylon, Pt. III., p. 173, var. excl.

Ceylon. Trincomalee and Central Province, up to 600 m., *Thwaites* C. P. 3720 (3720 A. in Herb. Kew); Thwaites 3540.

"The corolla is about 4 mm. long, the lobes and tube being equal in length. The lobes in the lower part and the throat bear scattered woolly hairs. The ovary is hairy as described by Thwaites.

"*S. micrantha* is very closely allied to *S. colubrina* from the western side of the Indian Peninsula, and its flowers especially resemble those of the specimens from Travancore. The usually narrowly-elliptic, lanceolate, acuminate leaves, and the corolla with lobes equal in length to the tube serve as a means of recognizing the Ceylon specimens. *S. micrantha* may be regarded as the Ceylon representative of *S. colubrina*, and both no doubt must be reckoned among the plants long known as 'lignum colubrinum.'

"It is very unfortunate that *S. micrantha* is not represented by fruits in our herbaria. The fruiting specimens assigned to it have been found to belong to *S. lenticellata* A. W. Hill. On the sheets of Thwaites 3720 and 3540 at Kew portions of fruiting specimens have been attached, which are identical with Thwaites 1866 excluded by me from *S. micrantha*. These and No. 1866 agree so closely with *S. lenticellata* from S. E. India that they have been referred to that species. Specimens in the Wallichian Herbarium under the label 'Ceylon 96 and Palamcottah 95' collected by Rottler in 1795 and 1796 have also been referred to *S. lenticellata*."

"**S. lenticellata** A. W. Hill; species ex affinitate *S. colubrinæ* Linn., et *S. micranthæ* Thw., sed ramis lenticellis conspicue instructis, foliis triplinerviis minoribus, segmentis calycis angustioribus, antheris orbicularibus distincta.

"*Frutex* scandens, ramis et ramulis striatis lenticellis insigniter instructis, cirrhis bijugis glabris. *Folia* obovata vel elliptico-obovata, basi et versus apicem cuneata, acuta

vel subacuta, mucronulata, aliquando retusa, 5–7 cm. longa, 2 cm. lata, glabra, superne vernicosa, triplinervia, venis nervisque prominentibus; petioli 5 mm. longi, e basi tumido orti. *Inflorescentiæ* axillares, multifloræ, circiter 3 cm. longæ; pedunculis et pedicellis pubescentibus. *Calyx* 1·25–1·5 mm. longus, segmentis anguste ovatis vel ellipticis subacutis subglabris vel pubescentibus marginibus hirsutis. *Corolla* 3·5–4 mm. longa, lobis repandis 2–2·5 mm. longis ovato-lanceolatis subacutis parti inferiore pilis laneis sparsis instructis tubo glabro. *Antheræ* orbiculares, 0·65 mm. diametro, filamentis 1–1·25 mm. longis. *Ovarium* cum stylo 3 mm. longum, hirsutum, ovario apice præcipue pilis erectis instructo. *Fructus* globosus, circiter 2 cm. diametro, 1–2-spermus; pericarpium crustaceum. *Semen* orbiculare, 1·4 cm. diametro, planum, circiter 2 mm. crassum, glabrum. *S. potatorum* Thwaites, Enum., p 201 quoad C. P. 1866. *S. micrantha* Thwaites, Enum., p. 425 et Trimen, Flor. Ceylon, Pt. III., p. 172 quoad C. P. 1866.

"Vern. Name: Cheroomolaghoo, according to a label on a specimen, dated 1828, in Herb. Wight preserved in the University Herbarium, Glasgow.

"S. India. Madras: Cuddapah Hill (7/81), *Beddome* 6, 5305 in Herb. Mus. Brit.; Madras, without precise locality, *Wight & Heyn* (*Wallich* 1589 b. in Herb. Heyn); Negapatam, *Herb. Wight*; Kurnool Hills, *Beddome* (1878); Palamcottah (1795), *Rottler* 30 *Wallich* 1585 b. (Herb. Klein ?) in Herb. Wall.; Chingleput Dist.; Kambakkam Droog, *Bourne* 2533; Kambakkam Hills (May, 1913, fruit), *Barber* 8862 in Coimbatore Coll. Herb.; Kouri Kandjera, *Leschenault* in Herb. Mus. Paris.

"Ceylon. *Rottler* 1796; *Wallich* 1585 b. in Herb. Wall.; without precise locality, *Thwaites* 1866; also fruiting specimens attached to sheets of *Thwaites* 3720, 3540 in Herb. Kew; fruits (labelled "near *axillaris*") Colombo, *Ferguson* in Mus. Kew.

"A very distinct species with its stems closely covered by conspicuous lenticels. The triplinerved leaves are relatively small and uniform in size, tapering regularly towards base and apex. In the flowers the orbicular anthers afford a

useful character for distinguishing the species, and the calyx segments are much narrower than is common in allied species.

" Wight on his label when sending the plant to Sir W. Hooker under the name *S. colubrina* (?) suggests that it is a new species, since Willdenow in contradiction to Indian botanists said it was not *S. Nux-vomica*. Specimens collected by Rottler at Palamcottah in 1795 and Ceylon 1796, and placed by Wallich under his number 1585 with *S. potatorum*, also belong to this species.

" Some references to the Ceylon specimens will be found in the notes under *S. micrantha* Thw. There is a bottle of ripe fruits with two leaves in fluid in the Kew Museum bearing the label ' *Strychnos* near *axillaris*, Colombo, W. Ferguson,' which apparently belong to *S. lenticellata*. They are about 2 cm. in diameter, 2-seeded, with a fleshy pericarp 5 mm. thick.

" It is unfortunate that Thwaites gave no exact localities with his specimens. Trimen, under *S. micrantha* (with which *S. lenticellata* is included), gives ' Low-country ' as the habitat, and mentions Peradeniya, Galle, and Trincomalee as localities. Whether these all refer to Thwaites 1866 as well as to the true *S. micrantha* is uncertain.

" Judging from the localities in which the Indian specimens have been collected, *S. lenticellata* is a dry country plant, and it would be likely to occur in similar situations in Ceylon, and therefore in the northern drier portion of the Island, which is in all essentials a part of India."

" **S. Benthami** C. B. Clarke in Hook. f. Flor. Brit. Ind., IV., p. 87 ; descr. emend. et ampl.

" *Caules* quadrangulares, pubescentes. *Folia* ovato-lanceolata, acuta vel acuminata, versus basin plus minusve cuneata vel rotundato-cuneata, 5·5–7·5 cm. longa, 2·5–3·5 cm. lata, superne glabra, pagina inferiore nervo medio hirsuto, 5 nervia, plus minusve triplinervia, nervis intermediis curvatis ; petioli 2–3 mm. longi, pubescentes. *Inflorescentiæ* axillares, paucifloræ, 5–8 mm. longæ ; pedunculis pedicellisque pubescentibus. *Calycis* segmenta 4, triangulari-orbiculata, breviter acuta,

marginibus breviter ciliatis, intus glabra. *Corolla* 2·5–2·75 mm. longa, lobis 4 crassis 1·5–1·75 mm. longis medio linea pilorum notatis. *Antheræ* 0·75 mm. longæ, apiculatæ, in sinubus insertæ, basi barbatæ. *Ovarium* cum stylo glabrum, 1·5 mm. longum. *Bacca* circiter 1 cm. diametro; pericarpium crustaceum. Dop in Bull. Soc. Bot. Fr., LVII., Mém. 19 (1910), p. 15; Trimen, Fl. Ceylon, Pt. III., p. 174; *S. minor* Benth. (non Blume) et var. *ovata* Benth. in Journ. Linn. Soc., I., p. 100; *S. minor* Thwaites (non Blume) in Enum. Plant. Zeylan., p. 201.

"Ceylon. Colombo (1860), *Thwaites* 187; without precise locality, *Mrs. General Walker*; *Col. Walker* 244; *J. S. Mackenzie*; *Dr. Kelaart.*

"The specimens under the name *S. colubrina*, Ind. Orient. Herb. D. van Royen et herb. Koenig in Herb. Mus. Brit. apparently belong to *S. Benthami.*

"Var. *parvifolia* Benth. in Journ. Linn. Soc., I., p. 101.

"*Folia* ovata, coriacea, marginibus reflexis, 2–2·5 cm. longa, 1–1·8 cm. lata. *Inflorescentiæ* pauciflorae, pleræque terminales. *S. Benthami* C. B. Clarke var. *parvifolia* Benth., C. B. Clarke in Hook. f. Flor. Brit. Ind., IV., p. 87; Trimen Fl. Ceylon, Pt. III., p. 174; Dop l. c., p. 15.

"Ceylon. Adam's Peak (1846), *Thwaites* 341; *Gardner* 580.

"Var. *angustior* Benth. in Journ. Linn. Soc., I., p. 101.

"*Folia* anguste ovato-lanceolata, acuminata, 3·5–6 cm. longa, 1·1–2 cm. lata, basi anguste cuneata. *Inflorescentiæ* pleræque axillares. Trimen, Fl. Ceylon, Pt. III., p. 174. *S. minor* Benth. var. *parvifolia* Thwaites, Enum. p. 201.

Ceylon. Matelli East (1863), *Thwaites* 341; Balangoda (1846), *Thwaites* 187.

"*S. Benthami*, with two of its varieties, *parvifolia* and *angustior*, as distinguished by Bentham, is distinct from other species in having a 4-merous corolla and calyx. The young twigs, leaf petioles, and the back of the midrib are pubescent. The variety *ovata* of Bentham is not maintained, as there is no good character to distinguish it from the type. Bentham's variety *nitida* with its 5-merous flowers, calyx hairy within, rhomboid leaves, &c., has been described as a new species under the name *S. trichocalyx* A. W. Hill."

" **S. trichocalyx** A. W. Hill ; species *S. Dalzellii* C. B. Clarke, calyce intus hirsuto affinis, sed foliis rhomboideis basi cuneatis floribus minoribus præcipue differt.

" *Frutex* scandens (?). *Caules* in juventute pubescentes striati, sub-quadrangulares. Folia obovata vel rhomboidea, versus apicem cuneata, acuta vel acuminata, basi cuneata in petiolis angustata, 5–7·5 cm. longa, 3–5 cm. lata, coriacea, superne vernicosa et glabra, marginibus paullo reflexis, pagina inferiore in angulis nervorum sæpius hirsuta, 5-nervia, triplinervia, nervis intermediis rectis non curvatis cum nervo medio acutangulos facientibus ; petioli 0·5–1 cm. longi, glabri ; cirrhi simplices. *Inflorescentiæ* axillares, 1–1·5 cm. longæ, congestæ, pedunculis pedicellisque pubescentibus. *Calycis* segmenta 5, subrotunda, marginibus ciliatis intus ad basin pilis erectis lineatim instructis. *Corolla* 3·5 mm. longa, 5-loba, lobis 2·5 mm. longis ellipticis subacutis crassis, intus supra medium linea pilorum notatis. *Antheræ* 0·75–1 mm. longæ, orbiculari-ovatæ, ad basin et paullo ad margines conspicue barbatæ. *Ovarium* cum stylo glabrum, 1·75–2 mm. longum. *Bacca* globoso-ovoidea, circiter 1·5 cm. longa, 1–2 sperma ; pericarpium crustaceum. *S. minor* Benth. var. *nitida* Benth. in Journ. Linn. Soc., I., p. 101 (non *S. minor* Blume). *S. colubrina* Thwaites, Enum. Plant. Zeyl., p. 201, non Linn. ; *S. colubrina* var. *zeylanica* Clarke in Hook. f. Flor. Brit. India, IV., p. 87 ; Trimen, Flor. Ceylon, III., p. 173. *S. micrantha* var. *rhomboidalis* Dop in Bull. Soc. Bot. Fr., LVII., Mém. 19 (1910), p. 14, quoad spec. Zeylan. tantum.

" Ceylon. Galagoma, *Thwaites* 330 ; without precise locality, *Thwaites* 2516 ; *Col. Walker* in Herb. Wight ; *Mrs. Genl. Walker* in Herb. Hook. (in Herb. Kew) ; Kandy, *A. Moon* 346 ; without locality, *Macrae* 197 in Herb. Mus. Brit. ; Galle, *Pierre* (1865) in Herb. Mus. Paris.

" A striking species with its rhomboid leaves, conspicuously cuneate or acute towards both base and apex. The specimens at the British Museum have single tendrils so presumably the plant is scandent. It is distinguished from *S. Benthami* by the 5-merous flowers and by the irregular line of erect hairs springing from near the base of the inner surface of the calyx segments as well as by the leaves.

"Clarke placed this plant under *S. colubrina*, an unfortunate position since it differs from that species both in the character of the corolla hairs and also in its glabrous ovary. Dop, in pointing out the latter difference, places it as a variety *rhomboidalis* under *S. micrantha*, a distinct species with woolly corolla hairs ; he also adds a plant from Cochin, which proves to be *S. Dalzellii*.

"The true alliance of this peculiar Ceylon species is no doubt with *S. Dalzellii* Clarke, from S. India, for not only is there some general similarity in the foliage, but the line of internal calyx hairs is found in both species—a feature not seen in any other eastern species of *Strychnos ;* in the corolla there is also close resemblance.

"According to Trimen, this plant is rather common in the dry and intermediate regions of Ceylon.

"Attached to the Pierre specimen at Paris is a beautiful series of drawings by E. Delpy (1903) showing the internal calyx hairs of this species."

"**S. Nux-vomica** Linn. Spec. 271 ; G. Don, Dict., IV., p. 65 ; Clarke in Hook. f. Flor. Brit. Ind., IV., p. 90—syn. Kurz, For. Flor., II., p. 166, *S. lucida* Wall. Cat. 1590 et loc. Tenasserim excl. ; Bedd. Fl. Sylv., II., t. 243 et Brandis, Indian Trees, p. 473, spec. Burm. excl. ; Trimen, Fl. Ceylon, Pt. III., p. 175 ; Dalz. & Gibs. Bombay Flora, p. 155 ; Benth. in Proc. Linn. Soc., I., p. 103, spec. ex Moluccis excl. ; Miq. Flor. Ned. Ind., II., p. 378 partim ; Cooke Fl. Bombay, II. p. 185 ; Dunstan & Short, Pharm. Journ. XV., ser. III., p. 1 et Icon. ; Dop in Bull. Soc. Bot. Fr., LVII., Mém. 19 (1910), p. 18 spec. Birman. *Anderson, Pierre* 3693 et var. *grandiflora* excl. ; Dop in Lecomte, Flor. Gén. Ind. Chin., IV., p. 168 spec. Siam., spec. *Pierre* (sub var. *oligosperma*), et var. *grandiflora* excl. ; Bourdillon, Forest Trees Travancore, p. 269 ; non Kurz, For. Fl. Brit. Burma, II., p. 166 ; non Craib in Kew Bull. 1911, p. 421. *S. Nux-vomica* var. *oligosperma* Dop in Bull. Soc. Bot. Fr., LVII. Mém. 19, p. 18 et in Lecomte, Flor. Gén. Ind.-Chin., IV., p. 169 spec. *Pierre* excl.

"India. Madras ; Travancore ; Bengal.

"Ceylon.

"Indo-China. Cochin-China: *Pierre* 3689; *Lefèvre* 385; *Thorel* 1026 in Herb. Mus. Paris; *Jumelle* (semina) in Herb. Kew. Cambodia spec. ex *Jumelle* in Herb. Kew. Laos: *Thorel* in Herb. Mus. Paris.

"An examination of the rich material of *S. Nux-vomica* from Calcutta brought to light the interesting fact that *S. Nux-vomica* Linn. is confined to India and Ceylon, and that the Burmese plant hitherto referred to this species is quite distinct.

"The fruit of the true *S. Nux-vomica* varies in size from that of a large to a small orange, according to Dunstan & Short l.c. A diameter of 5·6 cm. appears to be exceptional, and more usually they are about 3·5–4 cm. in diameter. The number and size of the seeds is also variable, 4 being the average number of good seeds. The circular button-like seeds with their satiny coats are easily distinguished from those of *S. Nux-blanda.*"

"**S. cinnamomifolia** Thwaites, Enum. Plant. Zeylan., p. 201; descr. emend. et ampl.

"*Folia* ovato-vel elliptico-lanceolata, apice sensim acuminata vel acuta, basi cuneata, rarius rotundato-cuneata, 8–9·5 cm. longa, 3·5–4 cm. lata, triplinervia, venis approximatis. *Inflorescentiæ* sublaxæ, pedicellis ferrugineo-pubescentibus. *Calyx* 1·5-2 mm. longus; segmenta late ovata, subacuta vel acuta, minute ferrugineo-pubescentia. *Corolla* 1·4 cm. longa, lobis circiter 4 mm. longis. *Antheræ* 1·5–1·75 mm. longæ, apiculatæ. *Fructus* globoso-ovoideus, 6·5–9 cm. longus, 5–7·8 cm. latus; pericarpium lignosum, 6–7 mm. crassum, læve, vernicosum. *Semina* 8–15, irregulariter elliptica vel orbiculari-elliptica, 2–3 cm. longa, 1·3–2·4 cm. lata, subcompressa, circiter 1 cm. crassa, sub-biconvexa, pilis sericeo-laneis dense vestita, plerumque margine incrassato circumcincta; C. B. Clarke in Hook. f. Flor. Brit. Ind., IV., p. 89 syn. excl.; Trimen, Fl. Ceylon, Pt. III., p. 174.

"Ceylon. Hantani District, moist low-country; 600–900 m., Thwaites 1867; without locality, *Gardner* 578; *Walker;*

seeds (Eta-Kiunda-wel) Col. Ind. Exhib. 171, 1886 in Mus. Kew (Eta-Kirindi-wel, *Trimen*); fruits and seeds, *Petch* (recd. 1917).

. . . . . .

"The seeds of the type which have recently been received at Kew through the kind offices of Mr. T. Petch are rather larger and thicker than those from Travancore, and are unusually biconvex and about 1 cm. thick. The wall of the fresh fruit is 6–7 mm. thick, and the seeds are embedded in a solid fleshy pulp. The seeds show a distinct marginal border, and have a dense felt-like covering of short hairs, which do not show the satiny lustre of those on the seeds of *S. Nux-vomica*. Prof. Greenish, who has kindly analyzed the seeds, informs me that they contain 2·07 per cent. of alkaloid, which is brucine, the percentage of strychnine being very small. The species may be distinguished principally by its leaves, which are markedly cuneate at the base.

. . . . . .

"It seems better to refer the Indian specimens of *S. cinnamomifolia* to a variety, since they differ from the Ceylon plant in having broader leaves with more rounded bases and somewhat different seeds.

"The resemblance between this species and *S. Nux-vomica* is considerable, but the latter being a tree with different leaves, fruits, and seeds, can easily be distinguished from the huge climbing plant."

[Note on the above.—T. P.]

It will be evident that further details are required concerning *S. tetragona*, *S. coriacea*, and *S. micrantha*. The varieties of *S. Benthami* might also repay attention; the inclusion of the common up-country var. *parvifolia* with the low-country *S. Benthami* always startles the novice in Ceylon botany, and var. *angustior* is little known.

The specimens in Herb. Peradeniya include the following which are cited here as they stand in the herbarium covers; the numbers in parentheses indicate the separate sheets:—

S. micrantha Thw. (1) C. P. 3720, without locality, two specimens, labelled *S. micrantha* Thw. (2) C. P. 3540,

originally labelled *Strychnos laurina* Wall., now labelled *S. micrantha* Thw., *S. Beddomei* Clarke, five specimens, marked "near Galle, Sept., 1857. Bibile, Feb., 1858"; a note near one specimen reads "a tree." All the foregoing are *S. micrantha ;* the ovary is villous, chiefly above, and the twigs are strongly lenticellate. (3) C. P. 3720, labelled *Strychnos micrantha* Thw., three specimens, marked "Between Ratnapura and Galle, March, 1861 ; Peradeniya, March, 1863 " ; one of these is *S. micrantha ;* the other two are *S. tetragona ;* the latter are small, one bearing only an inflorescence, and the other two inflorescences and three leaves, which are ovate, acuminate, or obtuse, not rounded at the base, minutely pubescent on both surfaces ; the ovary of *S. tetragona* appears lobed when soaked in dilute potash. (4) C. P. 1866 and C. P. 3540, originally labelled *Strychnos laurina,* now labelled " *S. Beddomei* Clarke quoad C. P. 3540 (Fl. Brit. Ind.), *S. micrantha* Thw., quoad C. P. 1866 (Fl. Brit. Ind.) " ; according to a note on sheet (3), C. P. 1866 was transferred here from that sheet by Trimen ; there are four fruiting specimens, two each of apparently different species. C. P. 1866 is marked "Kurunegala, July, 1853," C. P. 3540 was gathered "near Galle, *Capt. Champion,* before 1857 " ; Hill takes all (?) these fruiting specimens as *S. lenticellata,* but this point will be referred to again below. (5) A sheet, labelled *S. micrantha* by Trimen, collected by H. Nevill, Sober Island, Trincomalee, March, 1892 ; this is a doubtful specimen ; it is marked "a creeper" by Nevill ; the ovary is that of *S. micrantha,* but no corollas are available, and the habit appears different.

S. coriacea Thw. Under *S. Beddomei* Clarke var. *coriacea* is C. P. 3367, Central Province, February, 1855. There are also two sheets, collected by Trimen at Rasagala, Balangoda, in September, 1895, which show both flowers and fruits. The leaves of these latter specimens are identical with those of the specimens with the larger fruits in C. P. 3540 (not C. P. 1866) ; they are usually rounded at the base, ovate-lanceolate with long acuminate tips, up to 9 cm. long, 2·5–3·5 cm. broad ; as a rule, the leaves are glabrous, but a few minute hairs may be found in some cases on the under surface along the veins ; the fruits have been pressed, but they appear to have been at least

2·5 cm. in diameter, with a thinner wall than those of C. P. 3540; the flower is that of *S. tetragona ;* the shape of the leaf is that of *S. potatorum* in C. P. 3719, but the venation is different.

These Rasagala specimens appear to be *S. tetragona*, but if so, the shape of the leaf in that species is highly variable. The fruiting specimens in C. P. 3540 would then also be *S. tetragona.* In that case the leaves of *S. tetragona* are finely pubescent on both surfaces at first, becoming glabrous.

The fruiting specimens, C. P. 1866, have small, globose, or slightly ovoid fruits, 0·7–1 cm. diameter, apiculate with the remains of the style. Numerous fruits develop from a single inflorescence. The leaves are elliptic, cuneate at the base, obtuse and sometimes incised at the apex, triplinerved, small, the largest 4·5 cm. long and 2·5 cm. broad. The panicles are leafy. The leaves are now glabrous, but there are slight indications that they may originally have been pubescent on the upper surface. The identity of these specimens is doubtful, but if they are considered identical with the fruiting specimens of C. P. 3540, they must go under *S. tetragona.*

S. potatorum Linn. f. The sheets in Herb. Peradeniya are (1) C. P. 3719, no locality, two sheets; (2) C. P. 3719, Dambool, Nov., 1858, *Morris* (?) ; Trincomalee, 1861, *Glenie ;* and (3) a fruiting specimen, Ooma-oya, June, 1881, *Trimen.*

S. Benthami Clarke. The type is represented by (1) C. P. 187, Balangoda and Kalutara, *Gardner ;* Saffragam, Nov., 1866 ; (2) C. P. 187, Colombo ; and (3) Ellabodakanda, Kukulu korale, 1919. Of var. *parvifolia*, there are (1) C. P. 341, Adam's Peak, *Gardner ;* Hunasgiriya, April, 1851 ; Elk Plains, Sept. 1851 ; (2) C. P. 341, Maturata, Sept., 1851 (No. 122) ; (3) C. P. 341, Maturata, Nov., 1851 ; Dimbula, April, 1852 ; (4) Nilumalle, Madulkele, Oct., 1887, *Trimen ;* (5) Rangala, Sept., 1888, *Trimen ;* (6) Warriagala, Hantane, Dec., 1889, *Trimen ;* (7) Hakgala, April, 1906, *Smith* (two sheets) ; (8) between Hakgala and Fort Macdonald, April, 1906, *Smith* (aff. *parvifolia*) ; (9) Hakgala, May, 1911. Var. *angustior* is represented by (1) specimens in C. P. 341, Matale East, June, 1863 ; (2) Nitre Cave, Sept., 1888, *Trimen ;* (3) a specimen from Haputale, *Smith*, 1906, approaching var. *angustior*, but scarcely in a fit

condition for determination. The specimen C. P. 187, Balangoda, is assigned to var. *angustior* by Hill, but to the type by Trimen ; the specimens from Ellabodakanda have long, narrow leaves, and might equally be placed as *angustior*. But Thwaites's and Trimen's var. *angustior*, from Matale East and Nitre Cave respectively (both the same district), has a somewhat elongated lozenge-shaped leaf.

From the herbarium specimens the type form is found in the moist low-country, Colombo to Galle ; var. *parvifolia* is an up-country species common in the higher jungles ; while var. *angustior* is known with certainty only from the Nitre Cave district.

Strychnos trichocalyx A. W. Hill. In the cover of *S. colubrina* in Herb. Peradeniya are (1) C. P. 2516, without locality ; (2) C. P. 2516, marked Galagama, *Gardner ;* and Haragam, &c. ; (3) C. P. 2516, Anuradhapura, *Brodie ;* and Haragam, June, 1853, April, 1854 ; (4) Dambool, July, 1887, *Trimen* (leaves only) ; (5) Nilgala Hill, Uva, Jan., 1888, *Trimen*.

Sheet (1) is *S. trichocalyx ;* the calyx hairs are well developed, and the leaves rhomboidal, with a dense tuft of tomentum in the axils of uppermost pair of veins ; the leaves when dry are mottled green and black on the upper surface. Sheet (2) is *S. trichocalyx* as to one specimen, but the other two pieces are somewhat different, and sheet (3) has the same mixture. Sheet (5) is identical with the second specimens on sheet (2). These latter specimens have ovate-lanceolate leaves, acuminate, tapering gradually at the base, 7·5 × 3·3 cm., 5-nerved, glabrous beneath ; the flower resembles that of *S. trichocalyx*, but the calyx is shallower and has more rounded lobes, and the line of hairs on the inner side of the calyx lobes is variable, being fairly well developed in some flowers and almost absent in others. As far as the C. P. numbers are concerned, this is probably the plant collected at Haragama, which is not cited by Hill.

S. Nux-vomica Linn. The few specimens of this common species in Herb. Peradeniya are (1) C. P. 2839, Anuradhapura, *Brodie ;* Kurunegala, June, 1853 ; Trincomalee, Aug., 1859, *S. O. Glenie ;* and (2) C. P. 2839, Trincomalee, Aug. 1859, *S. O. Glenie*.

S. cinnamomifolia Thw. In Herb. Peradeniya are (1) C. P. 1867, Hantane, 1859; and (2) C. P. 1867, Galle, *Capt. Champion*; Hantane, &c., *Gardner*. It is known to occur at Henaratgoda.

(6) Hutchinson J. Cordia Myxa and Allied Species. Kew Bulletin, 1918, pp. 217–222.

The author has made a critical examination of the Kew herbarium specimens attributed to *Cordia Myxa*, and has come to the conclusion that the true *Cordia Myxa* L. is in all probability confined to Asia Minor and Egypt, where it is mostly found in cultivation. The plant attributed to this species in India and Ceylon is *Cordia obliqua* Willd.

Cordia Myxa has "Style arms short and broad, expanded fanwise towards the apex and with lobulate margins; leaves always more or less orbicular, entire or obscurely repand in the upper parts, always lightly covered all over the lower surface with white, short, setulose hairs, flabellately 5–7-nerved from the base; anther filaments nearly glabrous from the base."

Cordia obliqua has "Style arms long and slender and only sometimes slightly expanded at the apex; leaves variable, but usually penninerved at the base, if hairy, then the hairs fairly long and mainly in the axils of the nerves and near the midrib; anther filaments rather densely setose-pilose towards the base."

The following synonymy is given :—

"*Cordia obliqua* Willd. Phytogr. 4, t. IV. (1794); Sp. Pl., I. (1797); DC. Prodr., IX., 479 (1845); C. B. Clarke in Hook. f. Fl. Brit. Ind., IV., 137, excl. var. (1883); Watt, Dict. Econ. Prod. Ind., II., 565. *C. indica* Lam. Dict., VII., 49 (1806); DC. l.c. 500. *C. latifolia* Roxb. Fl. Ind. ed. Car. & Wall., II., 330 (1824); Dalz. et Gibs. Bomb. Fl. 173. *C. Myxa* Roxb., l.c. 332; Wall. Cat. 889; Wight, Ill., t. 169; Dalz. et Gibs. l.c.; Benth. Fl. Austral., IV., 386; Bedd. For. Man. 165, et Fl. Sylv. t. 245, fig. A; Brand. For. Fl. 336; Kurz, For. Fl., II, 208; Thwaites, Enum. 214; C. B. Clarke l.c. excl. var.; Watt, l.c. 563; Gamble, Man. Ind. Timb., 500-501; Merrill, Interp. Rumph. Herb. Amboin. 447 (1917); non. Linn. Vidi-maram,

Rheede, Hort. Malab., IV., t. 37. For further references to literature and detailed information as to native names and uses, see Watt, ll.cc.

" Widely spread over nearly the whole of the warmer parts of India and Ceylon (often cultivated), Malacca, Indo-China, Hainan, Formosa, Java, Philippines (*C. Blancoi* Vidal), New Guinea, and tropical Australia.

" Vernacular name of the fruit in India *Lasora ;* known to Anglo-Indians as *Sebesten.*"

(7) Sprague, T. A. Dolichandrone and Markhamia. Kew Bulletin, 1919, pp. 302–314.

Dolichandrone Rheedii Seem. should be *Dolichandrone spathacea* K. Schum. [Trimen notes (III., 283) that Ceylon specimens from Koenig in Herb. Brit. Mus. are the type of *Bignonia spathacea* L. f.—*Ed.*]

(8) Valeton, Th. New Notes on the Zingiberaceæ of Java and the Malayan Archipelago. Bull. Jard. Bot. Buitenzorg, 2nd ser., No. XXVII.

Valeton, in the course of his investigations into the Zingiberaceæ of Java and Malaya, has examined material of two Ceylon species, viz., *Zingiber Zerumbet* Sm., and the common Turmeric, supplied from Ceylon. Ceylon is the type locality for *Zingiber Zerumbet*, as the species was founded by Linnæus (*Amomum Zerumbet* Linn.) on Hermann's specimen. Valeton finds that *Zingiber Zerumbet* is not the same as *Zingiber amaricans* Bl., as it was thought to be by Schumann, who worked with dried specimens.

With reference to the Turmeric, Valeton's conclusions are of great interest. The accepted name of the common Turmeric has been *Curcuma longa* L. That name, according to Valeton, was based on a species described by Hermann (Hort. Acad. Lugd. Bat. (1687), p. 208, cum tab.). Hermann stated that he had brought the plant from the East, and that it was in the Leyden Botanic Garden at the time he wrote. Presumably he obtained it in Ceylon. According to Hermann's description,

Curcuma longa L. has bracts pale green, then yellow-reddish or pale yellow, and flowers pale yellow or purple-red. Moreover, he describes and figures a species with a lateral inflorescence.

Roxburgh took as *Curcuma longa* the species described by Koenig. Koenig's description in Retz. Obs. (1783), III., 72, calls for a species with a central inflorescence, white bracts, and a white flower, with a median longitudinal yellow stripe on the lip.

Valeton finds that the Ceylon Turmeric is the same as the species grown in Java and Malacca, and apparently also in Cochin-China. This has a central inflorescence. The bracts are pale green, often with a few longitudinal white stripes or bordered with white, while a few of the coma bracts are wholly white. The flower is creamy white, with a yellow median stripe on the lip. He has described it under the name of *Curcuma domestica* Val., and regards it as identical with *Curcuma longa* Koen. (non Linn.), and the *Curcuma domestica minor* of Rumphius.

The rhizomes supplied to Dr. Valeton from Ceylon were obtained from a village cultivator, and there is, therefore, no doubt that *Curcuma domestica* Val. is cultivated as Turmeric in Ceylon. Furthermore, plants in flower have recently been obtained from two native gardens in Ceylon and from the Experiment Station, Anuradhapura (1919), and these answer to the description of *Curcuma domestica*. In these latter specimens, however, the coma bracts, especially the uppermost, bear very minute purple-red spots, only distinguishable as spots with a lens, on the upper part of the bract, and chiefly towards the margin, so that the uppermost coma bracts are slightly tinged with purple at the edges.

Hermann described the plant of Hort. Acad. Lugd. Bat., p. 208, as having a terete rhizome, with concentric zones, yellow within, inclining to purple (puniceus) when old; his figure shows a more regular rhizome than is usual in Turmeric. The leaves were light green, acuminate. The flowering stalk arose from the rhizome at some distance from the leafy stem, and was naked below. The bracts were pale green at first, afterwards "ex flavo rubentia vel ex pallido flava,"

re-curved and mucronate at the apex. Hermann stated that the pockets formed by the bracts contained a " tenax et viscosus humor, collectus ex nocturno deciduo rore." Grimm made a similar statement concerning *Alpinia Galánga*, but it is no doubt equally applicable to all inflorescences of this type. The flowers had four petals, most usually pale yellow or purplish, and the lip was twisted and fimbriate (intorto et fimbriato). The fruit capsule was membranous, trilocular, with globose fuscous seeds, smaller than those of *Canna indica*.

Valeton takes the plant described above as *Curcuma longa* L., and lists it as an incompletely known species. But as far as specimens are concerned, *Curcuma longa* L. is the " Kaha. Curcumæ flos. Curcuma radice longa H. L. B. " of Hermann, Mus. Zeyl., p. 30, and Linn., Flora Zeylanica, No. 7, the specimen of which was seen and examined by Linnæus. As Trimen pointed out (Jour. Linn. Soc., XXIV., p. 132), " it must be confessed that Linnæus has rendered some of his species obscure by erroneous synonymy ; in working out the Flora Zeylanica he evidently endeavoured to embody as much as possible of what had been previously published of the plants of the East Indies generally ; and he has not infrequently given under the Ceylon species synonyms and references which belong to quite different Indian or Javan plants. In most, though not all, of these cases I think it must be allowed that the Hermannian specimens should determine what was the plant intended by Linnæus rather than his book references." Hermann's specimen of *Curcuma longa* is still in existence. It was examined in 1857 by W. Ferguson, who passed it as the Ceylon Turmeric. Ferguson noted that only the flower (inflorescence) remained ; but as Hermann described his specimen (in Mus. Zeyl.) as *Flos Curcumæ*, it may be doubted whether there was ever more than that. It was examined by Trimen in 1886, and enumerated by him without comment (*loc. cit.*). But it is remarkable that Trimen stated, in Flora of Ceylon, IV., p. 242, that Hermann's figure was a good figure of the Turmeric grown in native gardens in Ceylon, though it clearly shows a lateral inflorescence. There is a specimen of the Turmeric in the Peradeniya Herbarium collected by Thwaites and labelled *Curcuma longa* L. ; it has a central inflorescence.

The discrepancy in Hermann's figure was noted by Commelinus, who, in Hortus Malabaricus, XI., p. 21, stated "Delineatio Do. Hermanni etiam deficit, et cum illa nostri authoris minime conveniens, præsertim in progressu floris."

Dryander (Trans. Linn. Soc., II., p. 212) wrote that the figure of a single flower given by Hermann "is exactly like that of Manja Kua in the Hortus Malabaricus, but it cannot be copied from thence, as Hermann's book was published before the eleventh volume of that work. I can no otherwise account for this similarity than by supposing that Hermann had seen the drawing before the publication. The reduced figure of the whole plant given by Hermann is also erroneous, representing the scapus at a distance from the leaves; whereas it appears by the accounts of the Hortus Malabaricus, Rumphius, Koenig, and Jacquin, that the scapus comes out between the leaves."

Hermann's figure of the flower of *Curcuma longa* is similar to that of Manja Kua, Hortus Malabaricus, XI., tab. 10, but one could scarcely maintain that it is a copy. Manja Kua is *Kæmpferia pandurata*.

The explanation of Hermann's mistake may possibly be that he gathered and pressed the flower of Kaha, and obtained rhizomes of Kaha later, shortly before his departure. The name Kaha merely means yellow; it is the common name of the Turmeric, but it is applied, with prefixes, to other plants, *e.g.*, *Curcuma Zeodaria* is Haran-kaha, and *Curcuma aromatica* is Wal-kaha or Dada-kaha. Moon obtained *Curcuma Zeodaria* as Kaha, and assumed it was *Curcuma longa* L. Nothing is more common than to be given the Sinhalese plant name without its prefix. But the name Kaha is not confined to plants of the genus *Curcuma;* it has been applied to *Bixa Orellana*.

At present it is not known what *Curcuma longa* L. is. Hermann's specimen may be the common Ceylon Turmeric, but the figure in Hort. Acad. Lugd. Bat. is not. The nearest approach to the latter known in Ceylon would appear to be *Curcuma aromatica* Salisb., which, though often cultivated, was not among Hermann's specimens. Hermann collected Haran-kaha, *Curcuma Zeodaria* Rosc., but the

specimen was lost before his herbarium came into the hands of Linnæus. His description of the colour of the flower of *Curcuma longa* may be partly from memory and partly from the plant grown at Leyden.

There is, however, another possible explanation of Hermann's description of the colour of the flower. The Ceylon specimens grown by Dr. Valeton had white bracts and cream-coloured flowers with a yellow median stripe, and flowering specimens of Turmeric from three localities in Ceylon agree with that, with the addition that there is a very obscure purple flush at the edges of some of the bracts. But in another specimen obtained from a native garden as Kaha, the bracts are white, with purple or reddish-purple tips, the colour becoming more pronounced on the uppermost bracts. Unfortunately the flowers in this specimen were not sufficiently developed for determination ; they appeared to be purple. Thus, it is probable that more than one species is cultivated as Turmeric in Ceylon, and Hermann's description of the colour of the flowers may refer to two species cultivated as Kaha. That *Curcuma domestica* Val. is so cultivated is certain, but that fact does not close the subject. The flower of the species with purple bracts was central, so it affords no assistance as regards Hermann's figure.

The following papers are not recent, but they have not hitherto been taken into account by Ceylon botanists :—

(9) Prain, D. Some Additional Species of Convolvulaceae. Jour. Asiatic Soc., Bengal, LXIII., Pt. II., pp. 83–115 (1894).

The following extracts refer to Ceylon species :—

Rivea ornata Choisy var. *typica*. Ceylon, in the hotter parts of the Island. " There is nothing to add to Mr. Clarke's excellent description of this plant, which, as he remarks, appears strictly confined to South India and Ceylon."

Ipomœa glaberrima Boj.; *I. grandiflora* C. B. Clarke, in Flor. Brit. Ind., IV., 198, not of Lamk. Ceylon at Dichwale [Dikwella—*Ed.*], close to the sea, *Thwaites* C. P. 3536. [See Flora of Ceylon, III., p. 214.]

Ipomœa campanulata Linn. var. *illustris*. Ceylon, *Thwaites*.

(10) Prain, D. Some Additional Leguminosae. Jour. Asiatic Soc., Bengal, LXVI., Pt. II., pp. 347–518 (1897).

Crotalaria Wightiana Grah. Ceylon; Kandy, *Thwaites; Watson*. Pedrotalla, *T. Thomson*. [*C. rubiginosa* Willd. in Flora of Ceylon, IV., p. 11.]

Crotalaria Saltiana Andr. "This name is given as a synonym in F. B. I. It is, however, older than the name *C. striata* DC., which is more usually employed." "*Crotalaria Saltiana* . . . . never has any but obtuse leaflets, and in no instance is even the larger terminal leaflet more than 2·5 in. long."

Melilotus indica All. "This being the older name must be substituted for the name *M. parviflora*." [See Flora of Ceylon, II., p. 21.]

Indigofera constricta Trimen. [Further notes are given on this species.—*Ed.*]

Sesbania ægyptiaca Pers. var. *typica*. *Emerus* Burm. Fl. Zeyl. 93, t. 41.

Sesbania sericea DC.; *S. aculeata* var. *sericea* Benth., in Thw. Enum. 441 : Bak., in Flor. Brit. Ind., II., 115; Trimen, Flor. Ceylon, II., 34. Colombo, Ferguson. "There is no doubt that this differs specifically in the points noted by Mr. Baker. The pods most resemble those of *S. cannabina*, the foliage that of *S. paludosa*. It has only been once collected in Ceylon, and may possibly be an introduced species." [See Flora of Ceylon, II., 34.]

Desmodium Cephalotes var. *congestum; D. congestum* Wall. Ceylon.

Desmodium triquetrum DC., subsp. *genuina*. Ceylon.

Mucuna gigantea DC. Ceylon, *Walker*.

Dioclea javanica Benth. ; *Dioclea Fergusonii* Thw. Enum. 412. Ceylon, *Ferguson* (*Thwaites* C. P. 3817). [*D. reflexa* Hk. f., in Flora of Ceylon, II., 68.]

Phaseolus sublobatus Roxb. var. *typica ; P. trinervius* Bak. in Flor. Brit. Ind., II., p. 203. Ceylon.

Vigna lutea A. Gray. Ceylon, *Thwaites.*

Flemingia semialata Roxb. adopted for *F. congesta* var. *semialata* Baker.

Pongamia glabra var. *xerocarpa.* Ceylon, *Thwaites* 1489.

Mezoneuron hymenocarpum W. & A. ; *Cæsalpinia Gleniei* Thw. Enum. 414 in part. Ceylon, *Thwaites* 3815 in part. [See Flora of Ceylon, II., p. 101.]

Cassia mimosoides var. *Wallichiana,* as described by Baker, is *Cassia Leschenaultiana* DC. Var. *auricoma* " should not be separated as more than a variety from *C. Leschenaultiana.*"

Cynometra ramiflora var. *mimosoides* Baker. Ceylon ; at Trincomalee, *Rottler* (part of Wall. Cat. 5816C). [See Flora of Ceylon, II., p. 112.]

Cynometra ramiflora var. *heterophylla* Thwaites, Enum. 97. Ceylon ; sea coast, *Walker.*

The paper should be consulted for information concerning the species of Leguminosæ cultivated in India.

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EDITED BY

T. PETCH, B.A., B.Sc.

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STUDIES IN ENTOMOGENOUS FUNGI:

II.—THE GENERA HYPOCRELLA AND ASCHERSONIA.

BY

T. PETCH, B.A., B.Sc.

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Introductory.

THE genera *Hypocrella* and *Aschersonia* include species of fungi which occur superficially on the leaves and stems of living plants. *Hypocrella* is ascigerous and belongs

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to the *Hypocreaceæ*, while *Aschersonia* is pycnidial and belongs to the *Nectrioidaceæ*. It was originally supposed that the species of these genera were parasitic on the plants on which they occurred, but about twenty years ago it was discovered that certain species of *Aschersonia* were not parasitic on the plants, but on insects infesting the plants. Further investigations have shown that this is true, not only of all species of *Aschersonia*, but also of all species of *Hypocrella*, a genus whose members bear a striking resemblance to those of *Aschersonia*. Moreover, the opinion has become general that *Aschersonia* is merely the pycnidial stage of *Hypocrella*, and the accumulated evidence on this point is now so strong that the correctness of this view cannot be doubted.

These entomogenous fungi are parasitic, as far as has been determined, only on insects belonging to the *Lecaniidæ* and the *Aleyrodidæ*. The species exhibit at least one point of difference which is correlated with the division of insects on which they are parasitic, and they may accordingly be conveniently divided into two groups, the *Lecaniicolæ* and the *Aleyrodiicolæ* respectively.

The foundation of the present account of these genera was based on a collection of entomogenous fungi which had been amassed by Mr. E. E. Green, formerly Government Entomologist of Ceylon, and the well-known authority on *Coccidæ*. It has since been extended by the examination of numerous gatherings made in Ceylon during the last fifteen years; of the type specimens in the principal European Herbaria; and of collections which have been generously lent by mycologists in the tropics and by specialists who have contributed to the investigation of the tropical fungus flora. My thanks are due to the Directors and officers in charge of the herbaria of the Royal Botanic Gardens, Kew; the British Museum (Natural History); Berlin; and Paris, for the opportunities afforded me of examining the species of these genera in those collections; to Professors von Höhnel, Ito, Möller, Patouillard, Penzig, Raciborski, Saccardo, Spegazzini, H. Sydow, Theissen, and A. Zimmermann for the loan of types; and to Dr. E. J. Butler, Mr. F. W. South, Mr. H. S. Fawcett, and Dr. E. D. Merrill for general material. Professor Thaxter has liberally

placed at my disposal an extensive collection of West Indian species, which has furnished several stages hitherto unrecorded.

Aschersonia.

The genus *Aschersonia* was established by Montagne in 1848 (Ann. Sci. Nat., Ser. 3, Bot., X., p. 122) for the reception of two phyllogenous fungi from the tropics. His generic description is as follows :—

" Stroma carnosum, e cellulis tubulis flexuosis intricatis contextum, læte coloratum, primitus velo fugaci byssino concolori tectum. Perithecia membranacea, tenuissima, erecta, fibroso-cellulosa, in basidia abeuntia porisque late apertis (tandem rimose confluentibus) pertusa. Basidia filiformia sporas suffulcientia fusiformes hyalinas triseptatas seu sporulas quaternas foventes.—Fungi phyllogeni, tropici, *Hypocreis* affines."

He added that the genus represented, in the *Hypocreaceæ*, the tribe which in the *Sphæriaceæ* is distinguished by the absence of asci, that is, in which the spores are borne on basidia, and stated that it was near the *Phyllostigma* of Persoon, which approached it in structure. It differed from the latter in its elongated, fusoid, quadrilocular spores.

The two species were *Aschersonia taitensis* and *Aschersonia guianensis*, of which the following are the descriptions :—

" *Aschersonia taitensis* Montag. MSS. ; stromate hemisphærico, truncato, obtuso, luteo, peritheciis subquindenis erectis minutis, poris per rimulas extus conjunctis. Hab. in pagina superiori foliorum *Cyrtandræ* cujusdam taitensis lecta. Coll. Mus. Par. Parasit. No. 25.

" Descr. Sparsa. epiphylla. Stroma hemisphæricum, basi byssino membranacea expansum, luteum, ætate provectiori vaccinum, intus concolor, 1 ad 2 mm. diametro metiens, semillimimetrum altum. Perithecia stromati prorsus immersa, ovoidea, in collum brevissimum attenuata, erecta, $\frac{1}{3}$ millim. longa, apice poro sensim ampliante pertusa. Basidia filiformia, tenuissima, 20 ad 25 millimillim. longa, primitus sporas sustinentia. Sporæ tandem innumeræ, mucilaginis ope

erumpentes, minutissimæ, fusiformes, utroque fine acutissimæ, 15 millimillim. longæ, vix 2 millimillim. in medio crassæ, hyalinæ, sporulas quaternas intervallis manifestis sejunctas includentes.

" *Aschersonia guianensis* Montag. MSS. Stromate convexo orbiculari luteo, peritheciis erectis periphericis tandem discoideo-apertis, margine orifici exstante, sporis . . . . Hab. in folio ignoto in Guyana a cl. Leprieur lecta. Epiphylla."

He added that he had not been able to find the spores of the second species, but assigned it to *Aschersonia* from its structure and general appearance. Seven figures were given of *Aschersonia taitensis*. The pycnidia are shown as flask-shaped in section, distinct below, but united by furrows above. The stromata are discoid. The pycnospores in the figure are three-septate, and the illustration of the hymenium does not show any paraphyses. None of the figures shows a hypothallus, but in the vertical section the stroma is slightly expanded towards the base.

The characterization of the genus was erroneous on two points. There is apparently nothing in the specimens to justify the statement " primitus velo fugaci byssino concolori tectum," though from the description of *A. taitensis* one would expect the presence of a hypothallus; and the spores are not triseptate, but quadriguttulate, as, indeed, Montagne's original drawing shows.

In Sylloge Generum Specierumque Cryptogamarum (1856) Montagne republished his description of the genus with slight verbal alterations. In Saccardo, Sylloge Fungorum, III., p. 619, the description reads: " Stroma carnosum, hemisphæricum, turbinatum, v. pulvinatum, læte coloratum, primitus velo fugaci byssino concolori tectum. Perithecia (seu loculi) stromate subimmersa membranacea, tenuissima, erecta, fibroso cellulosa porisque late apertis (tandem rimose confluentibus) pertusa. Basidia filiformia. Sporulæ fusiformes hyalinæ, continuæ, subinde 3–4 guttulatæ spurieque septatæ.—Fungi phyllogeni, tropici, *Hypocreis* affines et paralleli, sed ascis carentes."

Nine species were listed by Saccardo in Sylloge Fungorum, III., p. 619 (1884), eight of which had been described as *Aschersonia*, while the other was a transference from another genus. *A. guianensis* was omitted. By the year 1900 the number of species had increased to twenty-six, but it is rather remarkable that Montagne's erroneous description still held the field. Lindau, for example, in Engler-Prantl, Naturlichen Pflanzenfamilien (1900), gives merely a translation of Saccardo's description, stating that the stroma is at first covered by a fugacious veil, and adding that the spores have inconspicuous septa. During the current century the description of new species has proceeded at a more rapid rate, and the total recorded up to the end of 1919 is sixty.

Hypocrella.

Species co-generic with those which are now included in the genus *Hypocrella* were assigned by the earlier mycologists to *Hypocrea*. Saccardo in 1878 (Michelia, I., p. 322) split off the genus *Hypocrella* and placed in it *Hypocrea discoidea* B. & Br., *Hypocrea Bambusæ* B. &. Br., *Hypocrea atramentosa* B. & C., and *Hypocrea semiamplexa* Berk. The new genus was briefly characterized as "Stroma et perithecia *Hypocreaceæ*. Asci octospori (?), sporidia filiformia." In Sylloge Fungorum, II., p. 579, a fuller description was given :—

"*Hypocrella* Sacc., Michelia, I., p. 322. Stroma carnulosum pulvinatum v. disciforme, v. subeffusum, læticolor v. fuscescens : perithecia stromate immersa v. semiimmersa. Asci cylindracei octospori, sporidia filiformia ascum subæquantia, subinde in articulos dilabentia. Genus *Epichloi* affine, stromate haud armillari diversum."

Ten species were included in the genus in Sylloge Fungorum, II. (1883). By the year 1900 this had been increased to about thirty, and at the present time (1919) the number of species recorded is seventy (including *Fleischeria* and *Moelleriella*).

Lindau, in Engler–Prantl, Naturlichen Pflanzenfamilien, gave practically the same generic description as Saccardo.

The Relation of Hypocrella to Aschersonia.

The suggestion that *Aschersonia* is the pycnidial stage of *Hypocrella* was apparently first made by Massee in an account of "*Hypocrella oxyspora*" in the Journal of Botany (1896), p. 151. His statement may be quoted verbatim :—

"The early breaking up of the spores into their component cells, and the subsequent disappearance of the asci, leaving the broken-up spores free in the perithecia, led Berkeley into the mistake of placing the present species in the genus *Aschersonia*. In fact, I am almost certain that I have seen conidia on the surface of young stromata resembling the cells of the broken-up ascospores in form in the present species. On the other hand, an examination of a portion of Montagne's type of *Aschersonia taitensis* Mont., the species on which the genus *Aschersonia* was founded, certainly has (*sic*) the young stromata covered with a dense stratum of fusiform spores ; the primordia of perithecia were also very evident in the substance of the stroma, hence in all probability the genus *Aschersonia* will prove to be nothing more than the conidial form of *Hypocrella ;* but in the event of this being proved, the name *Aschersonia* should be adopted for the genus, as having priority over *Hypocrella*."

I have not been able to trace any further observations by Massee on this point, but in his Text Book of Plant Diseases (1899) he wrote : "I have shown that species of *Aschersonia*, which hitherto were only known to produce a conidial form of reproduction on living leaves, produce an ascigerous form of fruit, following the conidial stage, on fallen dead leaves."

Though the association of *Aschersonia* with *Hypocrella* is undoubtedly correct, the observations which Massee cited in support of his theory are not accurate. "*Hypocrella oxyspora*" is an *Aschersonia*, as Berkeley described it, and its ascigerous stage was unknown until it was recently collected in Ceylon ; the conidia are not produced on the surface of the stroma, but in pycnidia. In *Aschersonia taitensis* the conidia do not cover the surface of the stroma, and the supposed primordia of the perithecia are the pycnidia in which they are produced, as was

described and figured by Montagne. And, further, no case is known in which the ascigerous stage is produced, following the pycnidial stage, on dead fallen leaves.

The first definite proof of Massee's theory was provided by Möller, who found both stages in the same stroma in the case of *Hypocrella cavernosa*. He also observed the occurrence of a pycnidial fungus, whose stromata were similar to those of *Hypocrella phyllogena*, and described it as the pycnidial stage of the latter, stating that such pycnidial fungi had been called *Aschersonia*. He was not able to find the pycnidia and perithecia in the same stroma of the latter species, but he records that Lindau had done so in specimens sent by him. In criticising the generic description of *Hypocrella*, Möller expressed the opinion that it required amendment by the inclusion of the pycnidial stage.

Zimmermann described both stages in *Hypocrella Raciborskii*, and Thaxter has found both in *Hypocrella turbinata*. In the examination of the material described in the present paper, I have found both stages in the same stroma in *Hypocrella discoidea*, *H. Reineckiana*, *H. olivacea*, *H. Mollii*, *H. Sloaneæ*, *H. ceramichroa*, *H. palmæ*, *H. viridans*, *H. palmicola*, *H. epiphylla*, and *H. Andropogonis*.

In the absence of any evidence from pure cultures, the discovery of both stages in the same stroma constitutes perhaps the only valid proof. But once the connection of *Aschersonia* with *Hypocrella* has been established, it may be legitimate to consider as stages of the same species an *Aschersonia* and a *Hypocrella* which occur together and possess identical stromata. The type specimen of *Aschersonia duplex*, for instance, includes exactly similar stromata which contain perithecia, and there can scarcely be any doubt that they are the same species. Again, *Hypocrella javanica* is commonly found in association with *Aschersonia Coffeæ*, and the stromata of the two are alike in colour, hardness, &c.

In *Hypocrella Raciborskii* the ascigerous stroma is generally developed at the margin of the pycnidial stroma. The same happens in *Hypocrella Sloaneæ*, though in both species purely ascigerous stromata also occur. But in the majority of cases in which both stages are known it is not correct to state that

the stroma is at first pycnidial and afterwards ascigerous. When both stages are produced in the same stroma, they occur, as a rule, at the same time ; the stroma is both pycnidial and perithecial. The pycnidia may be developed at the base and the perithecia higher up, and in that sense the pycnidia are the earlier ; but that arrangement is not universal. There is, however, in the majority of cases, no ground for the assumption that, as in so many other fungi, a pycnidial stage is completed before the perithecia appear. Vestiges of effete pycnidia are not usually found in the perithecial stromata, though they may occur, and in some species, *e.g.*, *Hypocrella turbinata*, may be a conspicuous feature.

At present it is not possible to state what factors govern the production of either stage. In one collection all the stromata will be pycnidial, in another all will be ascigerous. The combination of both stages in the same stroma is of rarer occurrence, as would be deduced from the numerous descriptions which refer to one stage only. This rarity, however, may be more apparent than real, for in many cases it is not possible to determine by mere inspection in what stage a given stroma is. In the Lecaniicolous species the perithecia and pycnidia are scattered practically at random, and unless the whole stroma is sectioned, it is more or less chance whether one finds both the stages if they happen to be present.

No evidence has been found in support of the statement that the *Hypocrella* stage is developed after the leaves have fallen to the ground. Under such circumstances the stromata decay. It is not uncommon to find stromata in process of decay on living leaves.

Structure.

Throughout the genera *Hypocrella* and *Aschersonia* the structure of the stroma is remarkably uniform. It is composed of thick-walled hyphæ, of practically uniform diameter, but intertwined without any definite direction, so that in section one sees some hyphæ in cross section as circular annuli, and others in longitudinal or oblique section in short, straight, or curved, or contorted lengths. The hyphæ vary in different species from 4 to 8 μ in diameter ; von Höhnel records a diameter

of 14 μ in *Fleischeria sclerotioides* (*Hypocrella olivacea*). The lumen is reduced to one-third or one-quarter of the diameter of the hypha, and the septa are inconspicuous. The thickened walls frequently exhibit lamination. Towards the periphery of the stroma the ends of the hyphæ may, especially in the Lecaniicolous species, form a distinct epidermal layer, either pseudoparenchymatous, or of short parallel "cells." In some, more especially the Aleyrodiicolous species, the ends of the hyphæ form a minutely tomentose layer. In the centre of the stroma, at the base, in the position originally occupied by the host insect, the hyphæ, probably those which at first permeated the body of the host, are usually thinner; in many examples of Lecaniicolous species, this region is defined by a red sub-hemispherical zone, or is sometimes entirely red.

As far as has been observed, the hyphæ of the stroma do not penetrate into the leaf on which it occurs. A slight pressure is sufficient to detach the stroma from the plant, a fact which accounts for the loss of specimens of the fungus in many herbarium examples. When detached, it is seen that the base of the stroma in many Lecaniicolous species is not uniform; the outer portion is usually smooth and glabrous, indicating that in that region the constituent hyphæ were merely adpressed to the surface of the leaf; the central portion which marks the position of the host insect is often powdery or rough, and bordered by the red zone previously referred to. This is not a constant feature, but some modification of it can usually be traced. Owing to the looser texture of the central area, a small part may remain adherent to the leaf when the stroma is detached. Thus, both on the stroma and the plant, traces of the previous attachment may persist, and these constitute what I have previously referred to as the characteristic *Hypocrella* "scar."

It will be recognized that the structure of the stroma resembles that of a sclerotium. The hyphæ are irregularly intertwined, have thickened walls, and are fused together into a compact mass. This is, perhaps, to be correlated with the habit of these fungi. They are parasitic on scale insects, not on the plant on which they occur. They are not able, therefore, to obtain water from the plant, as are fungi which

are actually parasitic on the latter, but must depend for their supply on the rain or dew which falls on the leaf. They must, therefore, be adapted to withstand periods of drought.

In general the stroma is solid, though in some of the *Aleyrodiicolæ* the hyphæ are somewhat loosely interwoven, and a section shows numerous interspaces. Species which have been described as " eroso-excavatis " prove, on examination, to have been hollowed out by insects (? beetles). In most of the available specimens of *Aschersonia Tamurai*, however, a small hollow space occurs in the centre of the base, without any evident sign of insect injury.

As a rule, the stromata of the Lecaniicolous species are harder than those which are parasitic on *Aleyrodidæ*. This is due to the more compact arrangement of the hyphæ, and, in part, to a greater thickening of the walls of the hyphæ in the former. This feature, however, cannot be employed as a generic character, as in the genus *Fleischeria* proposed by Penzig and Saccardo, since, apart from the difficulty of establishing standards of hardness, it would necessitate the separation in different genera of species which are undoubtedly co-generic. All grades of hardness exist, among the Lecaniicolous species, from *Hypocrella Schizostachyi*, the hardest species known, to *Hypocrella convexa*, which is no harder than many of the *Aleyrodiicolæ*, and it is not possible to define the degree of hardness which would qualify a species for inclusion in the genus *Fleischeria*.

In some cases the lumina of the hyphæ are filled with yellow globules, *e.g.*, in some collections of *Hypocrella Reineckiana*. This, again, is not a constant feature of any species, and there are indications that it varies according to the age of the stroma. The stroma is not gelatinous, *i.e.*, it does not absorb moisture and swell up when wetted. The contents of the hyphæ stain with cotton blue, but the walls do not.

In many species an extremely thin layer of hyphæ borders the base of the stroma, sometimes extending from it for one or two millimetres, closely applied to the surface of the leaf. It may be tomentose, its hyphal structure being clearly evident under a slight magnification, or the hyphæ may be fused into a membranous transparent film. It appears an

outgrowth from the basal portion of the stroma, but a series of developing specimens seems to indicate that it is part of the initial development of the fungus, the central portion becoming thicker later. This structure has received the name of "hypothallus." It does not underlie the whole stroma, but forms merely a border at its lowest edge; an apparent exception to this rule has been found in *Hypocrella bispora*, in some examples of which a thin, white, tomentose layer *underlies* the stroma and projects beyond it, but it appears doubtful whether this is really a part of the *Hypocrella* stroma.

Unfortunately the hypothallus is not a constant feature of any species, and cannot be employed to separate them. It is usually present in *Aschersonia placenta*, but it may be present or not in specimens on the same leaf. In general the presence of a hypothallus is usual in the species parasitic on *Aleyrodidæ*, but rare in those parasitic on *Lecaniidæ*.

Among the characters of the genus *Aschersonia*, Montagne included the presence, in the early stages, of a universal veil or covering which disappeared with age, and in this he has been followed by quite recent writers. But no such structure exists. One is inclined to suppose that Montagne assumed this character from the presence of a hypothallus, but no hypothallus is present, as far as I was able to discover, on the type specimens of either of his species. Nor are the specimens mouldy, as is the case with the type of *Hypocrella epiphylla*, in which the surrounding circular patch of mould has been described as a hypothallus.

The term "hypothallus" appears to have been employed in a very loose manner by the describers of species of *Aschersonia* and *Hypocrella*. It should denote a thin film or layer of hyphæ surrounding the base of the stroma, which appears quite distinct in character from the tissue of the stroma. On the other hand, many scutate or flattened stromata thin out regularly towards the margin, but the tissue of the stroma is evidently of the same character right up to the edge. In these latter cases, it is not correct to designate the thin edge a hypothallus.

The stromata are, in general, white, or brightly coloured in various shades of yellow, red, or brown. *Hypocrella bispora* is rather an exception, the specimens available being purple-brown or purple-black. In many species the colour is not constant, *e.g.*, *H. mollii* may be either white or pale yellow, *H. discoidea* orange-red or yellow, &c. The colouration often extends from the exterior to a depth of about 0·25 mm., forming a distinct peripheral zone ; this is well marked in ascigerous examples of *H. olivacea* and *H. palmicola*, and in the *Aschersonia* stage of *H. javanica*. As a rule, the colour is soluble in alcohol, and hence specimens preserved in alcohol are usually bleached.

Sections of the stromata treated with caustic potash change colour or give a coloured extract. Notes on these changes are given in the descriptions of the species. *Hypocrella olivacea* usually yields a yellow-brown extract, and *Hypocrella javanica* and *Hypocrella ceramichroa* a purple extract or colouration. But in other species this effect may vary with the condition of the stroma, as it does in many tropical species of *Hypoxylon*. In *H. Reineckiana* some specimens do not change colour, others may yield a yellow-brown extract from the perithecia, while others turn purple in patches. These changes are most evident in the Lecaniicolous species. In the case of the species parasitic on *Aleyrodidæ*, the colour changes with potash are usually slight, though the presence of a minute fragment of the insect may induce a totally different result ; a black *Aleyrodes*, which is commonly attacked by these fungi in Ceylon, yields a vivid colour with potash.

Apparently most species, but especially those parasitic on *Lecaniidæ*, turn black when old, independently of the growth of *Meliola*, &c., over them. And in this connection age is to be taken in its literal sense, not as indicating that the stroma has ripened its spores. Blackened stromata may be quite immature, the development of such having probably been arrested by adverse weather conditions. Many of the pale-coloured Aleyrodiicolous species turn green, especially round or in the ostiola ; the cause of this has not been ascertained. In some specimens of *Hypocrella Mollii*, collected in Ceylon, the ostiola are green on one half of the stroma, and

the normal yellow-brown on the other. *Aschersonia viridans* owes its name to this colour change.

The situation of the fungus, whether epiphyllous or hypophyllous, depends upon the position of the host insect, and is not of specific value. If a given species of insect were always confined to one position, and a given species of *Hypocrella* were parasitic only on one species of insect, then the information might in some instances serve to differentiate between species ; but neither of these conditions is true.

The Perithecia.

The perithecia are immersed in the tissue of the stroma. Even in cases where they appear to be more or less superficial, as in *Hypocrella Raciborskii*, there is a region of stromatic tissue surrounding the perithecium proper. In general, the perithecia are flask-shaped, and vary, between species, only in size and the relative lengths of the neck and body.

The wall of the perithecium is distinctly differentiated from the ground tissue of the stroma. It is, as a rule, from 20 to 30 μ thick, and is composed of more or less parallel hyphæ, densely compacted, running lengthwise of the perithecium. These hyphæ are narrower than those in the body of the stroma, and their walls are less thickened. The wall of the neck is usually thicker than that of the body of the perithecium and towards the apex it increases still more in thickness, so that the apex is expanded obconically. The upper face of the neck, which constitutes the ostiolum, is either flat or slightly conical, its edge in either case being level with the general surface of the stroma. The term "ostiola projecting," employed in descriptions of these fungi, must be understood to mean that the ostiolum is situated in a slightly elevated projection of the stroma, the elevation of the actual perithecial tissue being almost too slight to be noticed macroscopically.

The wall of the perithecium contrasts strongly with the tissue of the stroma. It differs, as a rule, from the wall of the pycnidium, and hence there is little difficulty in deciding from sections whether a given specimen is *Hypocrella* or *Aschersonia*, even when the perithecia are quite immature. The ostiolum

appears translucent when viewed under a slight magnification, and sometimes serves to indicate the character of the stroma without cutting sections, but it requires considerable practice, in many cases, to distinguish it from the translucent mass of spores which fills the orifice of a pycnidium.

The asci are at first long and cylindric, with a short tapering pedicel. The apex is thickened, and forms a distinct cap. In general, the ascus contains eight filiform spores, almost as long as the ascus, wound in a long spiral, but in some cases only two or four spores are produced. The spores become septate, and then divide into short cylindrical lengths, which in many cases subsequently increase considerably in breadth, and become barrel-shaped or oval. During these changes the breadth of the ascus notably increases. When the part-spores are first formed, they retain their original position, and the ascus, though broader, is still cylindric ; but ultimately the arrangement of the part-spores becomes quite irregular, and the ascus is then more or less clavate. It is not uncommon to find individual asci which present either the first and second, or the second and third, stages of development of the spores, with a corresponding difference of diameter in their upper and lower parts. Presumably the part-spores are liberated by the complete deliquescence of the asci ; I have not been able to discover any sign of dehiscence. Paraphyses have not been observed in the perithecia of *Hypocrella*.

The part-spores are, in general, rod-like with rounded ends, or narrow-oval, or barrel-shaped. Owing to the changes in shape which they may undergo subsequent to their first formation, it is difficult to be sure that one has, in any given case, the final form before him. One of the most remarkable features of the genus is the scarcity of the mature *Hypocrella* stage. In the majority of the species described the asci have been immature, and the same is true of most of the collections made in Ceylon during the last fifteen years.

The differences between the available ascospores of different species are very slight. *Hypocrella phyllogena* constitutes an exception in some of its forms, but the distinction is not constant. In some collections of this species the part-spore

is inflated in the middle, as figured by Montagne. Other collections, however, have merely oval part-spores, and it is possible that the former shape is only a transient phase. Alternatively, it may possibly be related to the difference in the winding of the ascospores which occurs in this species.

Möller collected specimens of *Hypocrella phyllogena* in Brazil and sent them to Bresadola, who described them as the type of a new genus, *Moelleria* (1896), which was subsequently modified to *Moelleriella*, owing to the previous existence of a genus of *Diatomaceæ* bearing the former name. The new genus was distinguished by having its asci polysporous originally, whereas in *Hypocrella* the asci at first contain two to eight long filiform spores. That decision was strongly combated by Möller, who maintained that Bresadola's *Moelleriella sulphurea* was a true *Hypocrella*, having eight-spored asci, and was, in fact, identical with *Hypocrella ochracea* Mass. and *Hypocrella Edwalliana* P. Henn.

In 1897 Saccardo and Lindau contributed to Hedwigia (Vol. XXXVI.) a paper entitled "Elenchus Fungorum Novorum," in which they stated of *Moelleria* that it was "Genus judicio cl. Möller omnino dubium et delendum," and pointed out that in any case the name must be changed. In the same volume (p. 223) Hennings, in describing *Hypocrella Edwalliana*, whose eight ascospores divided into part-spores in the ascus, wrote that Möller had informed him that the same condition obtained in *Moelleria sulphurea* Bres., and therefore the latter genus was identical with *Hypocrella*.

These statements evoked a lengthy and vigorous rejoinder from Bresadola, in which he upheld his previous description. Moreover, he had examined a specimen of *Hypocrella Edwalliana* furnished by Hennings, and declared that in that, too, the asci were polysporous. "Etiam in ascis junioribus sporas filiformes non vidi, sed tantum elementa sporarum quæ insuper neque ad lineam disposita, sed prorsus inordinate in asco jacebant." Further, he had sent specimens of *Hypocrella Edwalliana* to Saccardo, who agreed that the asci appeared to be *ab origine* polysporous.

I have examined the type specimens of *Moelleriella sulphurea* and *Hypocrella Edwalliana* in Herb. Berlin, and have no doubt that they are, as stated by Möller, the same species. In many cases the asci do appear polysporous from the beginning, but that is not really the case. This species differs from the majority of the species of *Hypocrella* in having its filiform spores wound in a very flat spiral, so that many turns occur in the length of the ascus. This is not a constant feature, even in specimens of the same collection. It would seem that this arrangement of the spores, crossing one another at frequent intervals, has produced the appearance of irregularity and led to the interpretation that the asci are polysporous.

The Pycnidia.

The pycnidia exhibit greater variation than the perithecia. In the *Lecaniicolæ* they are usually flask-shaped, or oval, or tubular. In small forms of *Aschersonia cubensis* they are globose, while in larger stromata of that species, and in *Hypocrella cavernosa*, they may be ovoid and flattened parallel to the surface. In *Hypocrella Reineckiana* and *Hypocrella cavernosa* the tubular pycnidia may penetrate almost to the centre of the stroma, and in both these species, as well as in *Aschersonia turbinata*, they may be branched.

The pycnidia of the *Lecaniicolæ* differ from the perithecia in not possessing a well-differentiated wall. The hyphæ of the stroma become more or less parallel and converge towards the pycnidium, and from this palisade layer the basidia arise. In the discoid species of the *Aleyrodiicolæ*, the pycnidia have a wall of parallel hyphæ resembling that of the perithecium, but very thin.

The immature stromata of *Hypocrella Reineckiana* frequently acquire a glaucous "bloom," which rubs off when the fungus is handled. This, as previously stated by Parkin, is due to the production of a superficial layer of conidia. The basidia of this external layer are scattered, not crowded as in the normal pycnidia, and the conidia are rather smaller than the usual pycnospores. This occurrence of conidia on the exterior

suggests that the pycnidia were originally merely depressions in the surface of the stroma; indeed, many of the shorter tubular pycnidia give the impression that they are formed by the development of the basidia on a small area, and the subsequent lag of the growth of that area behind that of the surrounding tissue of the stroma; and the mere flask-shaped or elongated-oval pycnidia could be derived from the tubular form by the constriction of the orifice. But in other cases, *e.g.*, in *Hypocrella olivacea*, the oval pycnidium is formed within the tissue of the stroma. The small forms of *Aschersonia cubensis* show very interesting variations in this respect; in fully-developed forms the apex of the stroma is umbilicate, and the globose pycnidium, which lies within the body of the stroma, opens at its highest point into the funnel-shaped depression. In some immature examples, however, there is no pycnidium in the body of the stroma, but a superficial layer, apparently of developing basidia, at the base of the depression.

In the *Aleyrodiicolæ* the pycnidia may be elongated-oval or almost flask-shaped, as in *Hypocrella Mollii*; or definitely globose or flattened-globose, with a distinct conical neck, as in the discoid species, *Hypocrella discoidea*, *Aschersonia flavocitrina*, &c.; or widely and irregularly open, as in *Aschersonia placenta*, *A. Aleyrodis*, *A. hypocreoidea*, &c. The first two types are formed within the tissue of the stroma; and the pycnidium of the discoid species opens by a distinct pore in the centre of a thin scarious area. But the pycnidium of the third type may originate either superficially or internally.

This latter type of pycnidium is an irregular cavity, circular or oval in plan, usually with a convoluted base. In the case of very thin stromata, such as generally occur in *Aschersonia hypocreoidea*, it is undoubtedly formed superficially, *i.e.*, by the development of basidia on the surface of the stroma. In other species, *e.g.*, *Aschersonia placenta* and *Aschersonia Aleyrodis*, the stromata may vary from mere films to a thickness of 1·5 millimetres, and though the basidia are produced superficially in the former, it is doubtful whether the same is true of the thicker stromata. Webber has described

the formation of the stroma in *Aschersonia Aleyrodis* as follows :—

" The fungus does not spread over the leaf to any extent, but grows upward in a mass, gradually spreading over the larval scale. It is not uncommon to find the perithecia (*i.e.*, pycnidia), with their bright coral-red masses of sporules formed in a circle round the edge of the larva while it is yet visible. As the *Aschersonia* develops, the hyphæ spread over the larva, forming a dense, compact stroma, which ultimately entirely envelops the larva. The stroma in this stage is thin and disc-like, the fructification being usually borne in a circle near the edge. The hymenium at this time is spread out on the surface of the stroma, or but slightly sunken, the sporules projecting in a conical coral-red or rufous mass. As the fungus develops, the stroma becomes thickened and hemispherical, and the hymenium gradually becomes immersed."

The interpretation is doubtless correct if we accept the view that the thin and thick stromata represent stages of development, *i.e.*, that the thicker stromata were produced by the continued growth of thinner stromata which were already bearing conidia. But that is not necessarily the case. In all probability the thick and thin stromata on a given leaf are all the product of the same infection, and consequently all of the same age, their different thicknesses being due to a difference in vigour of growth. The occurrence of stromata in which the pycnospores are immature, and the pycnidia nearly closed, would appear to show that the pycnidia in the thicker examples are produced within the stroma and subsequently open widely. In pulvinate forms of *Aschersonia placenta* the pycnidia are often oval with a narrow orifice. That the cavity of the pycnidium originates as an invagination of the surface of the stroma is not excluded.

The pycnidia are lined with short, densely crowded basidia. As far as my observations go, the basidia are simple, but Miyabe and Sawada have shown that branched basidia may occur in *Aschersonia Coffeæ*, *A. Tamurai*, and *A. marginata*. The pycnospores are produced singly at the apex of the basidium, and as the pycnidia are, when mature, completely filled with spores, while in some cases a dense mass of extruded

spores also covers the stroma, it would appear that a continuous production of spores takes place from each basidium. When mature, the spores are extruded in coloured masses. In the *Leeaniicolæ* and the discoid species of the *Aleyrodiicolæ* the spore masses from the individual pycnidia remain distinct, as a rule; but in those species of the *Aleyrodiicolæ* which have irregular and widely-open pycnidia, *e.g.*, *Aschersonia placenta*, the spore masses fuse into a continuous covering over the centre of the stroma. The pycnospores adhere strongly to one another and fill the pycnidium with a translucent mass, which is not easily removed. Prolonged soaking in water often fails to loosen the spores sufficiently to permit their evacuation from the pycnidia in a section of the stroma, and it is necessary to employ caustic potash to liberate them before the hymenial layer can be examined. Webber has figured an instance in which the pycnospores were extruded in erect columnar masses in the case of *Aschersonia Aleyrodis*, and I have observed the same in *Aschersonia placenta* kept in a glass dish in the laboratory, but, probably because of the greater humidity of the atmosphere, this phenomenon does not, apparently, occur in the open in Ceylon; the nearest approach to it is the columnar mass of spores, which sometimes crowns *Aschersonia oxyspora*. A comparison of the detached spores within a pycnidium with those in the extruded spore-masses leads to the conclusion that the spores increase in breadth after they have become detached.

The shape of the pycnospores shows very little variation. In general they are fusoid or narrow-oval, with pointed ends. When immature the broadest part is generally situated towards one end, but they become more regularly oval subsequently. In a few cases they show distinctive characters, *e.g.*, in *Aschersonia basicystis* (*Hypocrella phyllogena*), *Aschersonia turbinata*, and *Aschersonia oxystoma*. The pycnospores of *A. basicystis* are usually furnished with fine points, up to 4 μ long, though others, merely narrow-oval, may occur in the same pycnidium. *Aschersonia turbinata* has broadly oval spores, with abrupt short points which appear solid. The spores of *A. oxystoma* appear to resemble those of *A. turbinata*, but the effect is produced by the concentration of the contents into an oval

mass, leaving the tapering ends apparently empty. Vacuolation is common both in pycnospores and ascospores (part-spores), but it is not a constant feature in any species.

The species of *Aschersonia* parasitic on *Aleyrodidæ* differ from those parasitic on *Lecaniidæ* in having long filamentous paraphyses arising with the basidia from the hymenial layer. This difference has been found to exist in all cases in which the host insect has been determined. The paraphyses are not septate, but in many cases they exhibit light and dark lengths, due apparently to a discontinuous variation in their contents. This was recorded by Webber for *Aschersonia Aleyrodis*, and I have noted the same thing in *Aschersonia placenta*, *A. hypocreoidea*, and *A. Goldiana*, but in no case is it constant. The length of the paraphyses is variable, but the range in each species provides a character by which the species can be separated.

Association with Insects.

Webber, in 1894, as the result of his investigations into the fungi and insects on *Citrus*, was the first to demonstrate that species of the genus *Aschersonia* were parasitic on insects. He showed that *Aschersonia Aleyrodis* was parasitic on *Aleyrodes citri* R. & H., *A. turbinata* on *Ceroplastes floridensis* Comstock, and, judging from his description, *A. cubensis* on *Lecanium hesperidum* L.

Several years elapsed before Webber's discovery had any influence on the writings of systematic mycologists. Hennings, when describing five species of *Aschersonia* from Java in 1902, noted their association with scale insects, apparently with some astonishment, and wrote that it was a remarkable phenomenon that these fungi generally occurred with various species of *Lecanium*, to which they bore so great a resemblance in form and colouration that he considered this was to be regarded as an instance of mimicry (Hedwigia, XLI., pp. 145, 146).

Webber had suggested that all species of the genus *Aschersonia* were entomogenous, and that view was supported by Parkin in his paper published in 1906. Parkin recorded eight collections of *Aschersonia* parasitic on species of *Aleyrodes*

and seven on species of *Lecanium*. From the specimens left by him these included *Aschersonia placenta*, *A. confluens*, *A. hypocreoidea*, *A. samoensis*, *A. Coffeæ*, and *A. marginata*.

Since 1904 species of *Aschersonia* have generally been described as occurring on scale insects. Hennings described *Aschersonia parasitica* on a coccid on *Andropogon* in 1904, Patouillard described *Aschersonia pisiformis* on a Coccus on *Cocos nucifera* in 1906, while Koorders in 1907 enumerated *Aschersonia Eugeniæ*, *Aschersonia Henningsii*, and *Aschersonia lecanioides* as parasitic on scale insects. The position at the present day is that stated by Thaxter : "There can be no question in the mind of any one who has had an opportunity to examine them in a fresh condition that they are strictly entomogenous, like the species of the genus *Hypocrella*, which have a similar habitat on various species of scale insects."

The recognition of the entomogenous nature of *Hypocrella* is of later date. The first species described as parasitic on a scale insect was *Hypocrella Raciborskii* by Zimmermann in 1901.

Parkin in 1904 was of opinion that the genus *Hypocrella* was one which might eventually be shown to be of common occurrence on scale insects. He recorded two collections parasitic on *Lecanium*, now known to be *Hypocrella ceramichroa* and *H. Reineckiana*, respectively, and a third gathering on *Chionaspis vitis*, which is not now available ; this last determination was, perhaps, erroneous, as no species has since been found on *Chionaspis*.

Raciborski, in 1906, stated that he had usually found *Hypocrella* parasitic on scale insects, and recorded that habit for *Hypocrella Amomi*, *H. convexa*, and *Barya salaccensis* (*H. Raciborskii*). But Koorders, in 1907, described *Hypocrella Grewiæ*, *H. Mollii*, and *H. Engleriana* without reference to any host, except the plants on which they occurred.

In 1909 von Höhnel added three species, *Hypocrella cretacea*, *H. bispora*, and *Fleischeria sclerotioides*, to the list of those known to be parasitic on scale insects.

In many gatherings the development of the fungus on the scale insect is quite obvious, as the stroma does not completely cover the scale, but forms a ring round and over the outer edge of it. This occurs, as far as has been observed, only

in the *Aleyrodiicolæ*. It is of frequent occurrence in *Hypocrella discoidea*, *Aschersonia placenta*, and *Aschersonia Zenkeri*, and has been found in immature examples of *Hypocrella Mollii*. The type specimen of *Aschersonia parasitica*, and Diels' specimen of *Aschersonia duplex*, exhibit the same formation. In this group, moreover, it is not uncommon to find traces of the insect in the base of the fully-developed stroma.

In the Lecaniicolous species this annular development of a sporiferous stroma apparently does not occur. But, on the other hand, the stromata frequently develop eccentrically on the scale, so that a portion of the latter is left exposed. This group also differs from the former in that, as a rule, no trace of the scale insect is discoverable within the fully-developed stroma. It is, however, sometimes possible to find in one gathering a series of stages of development, in the more immature of which the scale is still evident, as is the case with Parkin's specimens of *Hypocrella ceramichroa*.

It is necessary to exercise great caution in determining on what insect an *Aschersonia* or a *Hypocrella* is parasitic. It does not follow that, because a certain scale insect is found on a leaf in company with an entomogenous fungus, the fungus is parasitic on that particular insect. Several scale insects may be found together on a single leaf, and if a *Lecanium* and an *Aleyrodes* occur on the same leaf, a Lecaniicolous *Aschersonia* may obliterate all the former, leaving only the *Aleyrodes*. Consequently, the existence of numerous scale insects in company with an *Aschersonia* is rather an indication that the fungus is not parasitic on that insect. The only certain method of identification is to find the early stages of development of the stroma before the insect has been completely covered by it.

In Japan and Formosa it has been recorded that *Aschersonia marginata*, a Lecaniicolous species, and *Aschersonia hypocreoidea*, an Aleyrodiicolous species, have occurred on *Parlatoria zizyphi*. These are the only records of any *Aschersonia* on *Parlatoria*, and, in view of experience in other countries, they would seem doubtful.

The growth of *Aschersonia* and *Hypocrella* on insects having been established, there yet remains the possibility, which has

been propounded on several occasions, that these fungi are not parasitic on the living insect, but merely develop as saprophytes on their remains after death. On this point, Webber's observations appear to be conclusive: "Apparently mealy wing *Achersonia* (*A. Aleyrodis*) attacks the mealy wing only in the larval and pupal stages. The infection probably takes place most abundantly while the larvæ are young. The mature larvæ and pupæ are, however, frequently attacked. At Myers, Fla., June 6, 1895, the writer found *Aschersonia* very abundant in the early stages of development. Most of the larvæ were just approaching maturity. It was at that time almost impossible to find good mature specimens of the *Aschersonia*, pustules which developed on the preceding brood of larvæ, which matured in March, having become old and weather-worn. The first indication of the effect of the fungus on the larvæ of the mealy wing, as observed by the writer, is the appearance of slightly opaque yellowish spots usually near the edge of the larva. In the early stages of infection the larva becomes noticeably swollen, and appears to secrete a greater abundance of honeydew than normally. It is probable, however, that owing to the weakened condition of the larva the honeydew is not expelled with sufficient force, so that as it is slowly discharged it collects about the insect, and this would make it appear that there is an excessive amount . . . .

"As the *Aschersonia* develops, the interior organs of the larva appear to contract away from the margin, leaving a narrow circle, which becomes filled with hyphæ. This circle becomes opaque and whitish, presenting a very characteristic appearance. Shortly after this the hyphæ burst out around the edge of the larva forming a dense marginal fringe. This may form all around the larva at about the same time, or develop at one portion of the margin sooner than at the others. The body of the larva at this time is plainly visible, but it is opaque and yellowish throughout. Death usually ensues, the writer believes, before the hyphæ burst out."

According to Fawcett, the two methods advised by Webber for introducing *Aschersonia Aleyrodis* into orange groves infested with *Aleyrodes citri* met with fair success. These

were (1) pinning fungus-bearing leaves into trees infested with *Aleyrodes citri* in such a way as to cause the fungus spores to come in contact with larvæ not yet infected, and (2) planting small trees with fungus-infected larvæ in a grove, so that the fungus-bearing leaves came in contact with the leaves on which it was desired to start the fungus. Successful introductions of the *Aschersonia* have been obtained by Berger by spraying the spores on the trees infested with the insect. There is, however, an element of doubt in experiments of this kind, which prevents their citation as successful examples of artificial infection. Possibly a better instance is the successful infection of *Aleyrodes vaporarium* by *Aschersonia Goldiana* (misdetermined as *Aschersonia flavocitrina*), accomplished by Stene in the greenhouse at the Rhode Island College of Agriculture, as in that case the possibility of natural infection was remote.

The experiment last cited illustrates a point which is self-evident to any one who has collected any considerable quantity of these fungi in the field, viz., that their parasitism, as far as the available evidence goes to prove, is not specialized. This has been noted chiefly in connection with the commoner Lecaniicolous species, of which a large quantity of material is available. In the case of Ceylon and Eastern collections the host insect has been determined in a number of instances and it is clear from the records that *Hypocrella Reineckiana*, for example, can attack a wide range of species of *Lecanium*.

In America *Aschersonia Aleyrodis*, according to Morrill and Back, has been found to attack *Aleyrodes citri*, *A. nubifera* Berger, *A. inconspicua* Quaintance, *A. floridensis* Quaintance, *A. howardi* Quaintance, and *A. abutilonea* Hald. *Aschersonia Goldiana* is recorded by the same authors as parasitic on *A. citri* and *A. nubifera* only.

Conversely, any given species of *Lecanium* or *Aleyrodes* may be attacked by a number of species of *Aschersonia* or *Hypocrella*. This is indicated by the occurrence of two or more species of these fungi on the same leaf. *Hypocrella olivacea* frequently occurs with *Hypocrella javanica* and *Hypocrella Reineckiana* on *Lecanium oleæ* in Ceylon. *Hypocrella discoidea* is often accompanied by *Hypocrella Mollii*,

or, more rarely, by *Aschersonia placenta*. *Aschersonia badia* usually occurs with *Hypocrella Mollii*. In all these cases there is little doubt that the fungi are parasitic on the same species of insect.

There may, of course, exist cases in which a particular species of fungus is confined to one species of insect, but no evidence in support is as yet available.

Distribution.

The material of these genera in herbaria is, as a rule, remarkably scanty. One would imagine that in many cases the fungus has been accidentally gathered on phanerogamic specimens collected for distribution, and discovered subsequently in the herbarium. Types frequently consist of a single leaf bearing only two or three examples of the fungus, and in many cases the fungi on the leaf belong to more than one species. It is not to be wondered at, therefore, that in the case of the commoner species the list of synonyms is somewhat lengthy, since the material from which the species was described is often insufficient to give any idea of its range of variation.

The examination of the herbarium collections would lead to the conclusion that species of these genera are rare. But it is not difficult, according to Ceylon experience, to collect large numbers of a species, provided one devotes the time to it. Of course, cases do occur when a single specimen is found, and a thorough search fails to reveal more, but, in general, the systematic examination of a bush or tree on which a specimen has been found will result in the discovery of dozens, or even hundreds. It has to be remembered, however, that the fungus is parasitic on a scale insect, not on the plant, and its parasitism is not specialized. Consequently, a collection from one plant, even if all on the same scale insect, may include several species of *Aschersonia* or *Hypocrella*.

These genera are essentially tropical, no species being known from temperate climates. Several species are found in Florida, but the majority occur within the tropics.

With two exceptions, one of which is doubtful, the species of the Western Hemisphere are distinct from those of the

Eastern. Closely allied species occur in the two regions respectively, *e.g.*, *H. palmæ* and *H. olivacea*, *H. epiphylla* and *H. Reineckiana*, *Aschersonia Aleyrodis* and *A. placenta*, but they are sufficiently different to be maintained as distinct species. *H. palmicola*, however, has been found in Trinidad and in Madagascar, and the doubtful exception to the rule, *Hypocrella caulium*, is recorded from Brazil and Africa. The stromata of the Brazilian and African collections of the latter species differ considerably in shape, but the variation is not much greater than that which is known to occur in *Hypocrella olivacea ;* unfortunately, in none of the collections yet made are the stromata mature.

Classification.

The generic descriptions of *Hypocrella* and *Aschersonia* may be revised as follows :—

Hypocrella.—Stroma superficial, easily detached, fleshy, sclerotioid, composed of intricate thick-walled hyphæ ; brightly coloured, blackening when old ; subglobose, hemispherical, or pulvinate. Perithecia usually flask-shaped, immersed, wall distinct from the tissue of the stroma ; asci cylindric, capped, two to eight-spored ; no paraphyses ; spores filiform, almost as long as the ascus, separating into short part-spores within the ascus ; part-spores hyaline, continuous, rod-like, or becoming oval. Pycnidial stage, *Aschersonia*, in the same or a similar stroma. Parasitic on *Lecaniidæ* and *Aleyrodidæ*.

Aschersonia.—Stroma as in *Hypocrella*. Pycnidia immersed, tubular, flask-shaped, oval, or globose, or widely-open convoluted cavities : basidia simple or branched ; paraphyses long and filiform, or wanting ; pycnospores hyaline, continuous, fusoid or narrow-oval. Parasitic on *Lecaniidæ* and *Aleyrodidæ*.

In general the genus *Aschersonia* has not presented any difficulties to mycological systematists. One or two species have been attributed to *Hypocrea*, but Montagne's description has been sufficient to prevent many errors in generic determination. It may be noted that of Montagne's two species one is Aleyrodiicolous and has paraphyses, while the other is apparently Lecaniicolous. Montagne's description does not

mention paraphyses, and by universal consent the genus has been held to include species with paraphyses and species without them.

In the genus *Hypocrella* conditions are different, and a number of species have been included in the genus, either by their original describers or by transference, which are plainly not co-generic with *Hypocrella discoidea*. The character relied upon appears to have been merely the presence of perithecia with filiform ascospores immersed in a stroma. In some cases discomycetes have been referred to *Hypocrella*, but the most frequent error has been the inclusion of species of *Balansia*.

The genus *Balansia* Speg., and a few allied genera, comprise a group of species biologically well defined if not easily distinguishable by systematic characters. Most of the species are parasitic on grasses, and form a black stroma, which may be pulvinate, or elongated, or may give rise to stalked stromata with pulvinate or rounded heads. The perithecia are embedded in the stroma, are usually thin-walled, and densely crowded in a distinct peripheral layer. The asci are cylindric and capped, resembling those of *Hypocrella*, but with a slightly longer pedicel, and the ascospores are filiform and almost as long as the ascus. Möller states that the spores of *Balansia ambiens* and *Balansia diadema* are septate, and divide when placed in a nutrient solution; that the spores of *B. regularis* are also septate, but do not divide in the ascus; and that *Balansia redundans* has septate spores. He also states that the spores of *Ophiodothis Henningsiana* (=*Dothichloe*) and *Ophiodothis rhaphidospora* (=*Linearistroma*) have septate spores, which do not divide within the ascus. I have not been able to observe septa in the spores of the available specimens of *Balansia brevis* (B. & Br.) v. Höhnel, *B. Panici* (Massee), *B. axillaris* (Cooke) and *B. Bambusæ* (B. & Br.).

In many cases the stroma of *Balansia* seems superficial, *e.g.*, in *Balansia brevis* and *B. Panici*, where it appears to be seated longitudinally along a leaf, or in *B. Bambusæ*, in which it is situated at the apex of a short shoot. Examination of the stroma shows that in the first two cases the stroma completely encloses a lateral shoot, and adheres on one side to the leaf,

from the axil of which the shoot arose. In *Balansia Bambusæ* the stroma encloses the inner leaves of the shoot, and produces an external perithecial portion at the apex. *In all cases the tissue of the stroma is composite, being formed partly of fungus tissue and partly of the almost unmodified tissues of the host plant.*

Ophiodothis Atkinson, according to Atkinson and von Höhnel, is identical with *Balansia* Speg. Möller included the species with stalked perithecial heads in *Balansia*, and the pulvinate forms in *Ophiodothis*. *Dothichloe* Atkinson differs only slightly from *Balansia*, practically only in the thickness of the stroma, and is scarcely worthy of retention. Similarly, *Balansiopsis* v. Höhnel and *Linearistroma* v. Höhnel are scarcely distinct from *Balansia*. If these are retained, it would appear that Möller's distinction between *Ophiodothis* and *Balansia* should hold. *Ophiodothella* v. Höhnel, originally proposed by Hennings as a subgenus of *Ophiodothis*, appears to belong not to this group, but to the *Dothidaceæ*.

The genera referred to above agree in having a composite stroma, and, with the genus *Claviceps*, they constitute the *Clavicipiteæ*. They differ from *Hypocrella* in the structure and colour of the stroma, and in having filamentous septate spores which do not divide into part-spores in the ascus. It appears to be generally accepted that the genus *Ephelis* includes the conidial stages of *Balansia*, though Möller stated that the conidial stage of *Balansia redundans* had no resemblance to *Ephelis*. Möller obtained a *Cephalosporium* form on the germination of the ascospores of the latter species, but it does not necessarily follow that that is the form which occurs in nature, or that it is the only conidial form of the species. Immature stromata, which probably belong to this group, are common on the inflorescences of grasses in Ceylon; they usually consist of white or grayish mycelium, which binds together the individual spikelets into a continuous mass.

Dussiella Pat. has been attributed in part to *Hypocrella*. The genus was founded by Patouillard in 1890 on three collections from widely-separated localities. The first of these, from North America, had been named *Hypocrea tuberiformis* by Berkeley and Ravenel. With this Patouillard joined a specimen from Caracas in Herb. Berlin, and another

from Martinique. Berkeley's specimen was sterile, the Caracas specimen ascigerous, and the Martinique specimen conidiiferous.

In section the ascigerous stroma is seen to consist of superposed concentric zones, and its constituent hyphæ are thickened, refringent, and gelatinous. The perithecia are confined to a zone about 1 mm. thick at one end of the stroma, and their ostiola resemble the pores of a Polyporus. This ascigerous area is surrounded by the remains of a filamentous mycelium. The perithecia are narrow and deep, and contain cylindrical asci and abundant paraphyses. The ascospores are filiform and (?) septate.

The conidial stroma, like the sterile and ascigerous forms, is surrounded by a white mycelium. In section it is found to consist of a white basal part, a cortical zone, and an intermediate softer tissue. The intermediate tissue is composed of numerous tubes which run from the base to the cortex. These tubes are lined with clavate basidia, which bear brown, spherical, verrucose spores, 3 μ diameter. Patouillard refers to this as a *Ceriomyces* form of the ascomycete.

The details given above are quoted from Patouillard's paper (Bull. Soc. Myc. France, VI., p. 106). In 1891 Atkinson published a paper in which he dissented from Patouillard's determination, and described Berkeley and Ravenel's species as *Hypocrella tuberiformis* (Berk. & Rav.) Atk., nec *Dussiella* Pat. Atkinson described the stroma as stratose, at first clothed with hyphæ, which bear hyaline conidia, 7–10 × 3·5–4 μ. The perithecia are sessile or with the base immersed, and the ascospores are filiform, multiseptate, finally separating into part-spores.

Rick has recorded further details concerning *Dussiella*. He states that the fungus appears to be merely epiphytic. At first it is white and covered with a conidial layer, but becomes red-brown later. He describes the stroma as white internally, and does not mention any zonation. With regard to the ascospores, he states that they remain undivided even after their extrusion from the ascus. Paraphyses were present in the perithecia. According to Rick, the conidial stage of *Dussiella* belongs to the *Stilbaceæ*.

The discrepancies between the accounts furnished by Rick and Patouillard suggest that these authors were dealing with different fungi. It is, moreover, quite possible that the three collections described by Patouillard were not related. Evidently *Dussiella* requires further investigation on the spot before the various accounts can be harmonized. But in any case it does not appear that any of the fungi described under this name can be referred to *Hypocrella*. The stratose stroma, and the conidial stages described by the three writers quoted, are unlike anything in the latter genus.

The genus *Moelleriella* has already been referred to, and in the opinion of the writer the type specimen, *Moelleriella sulphurea*, is *Hypocrella phyllogena*. Rick has described another species of *Moelleriella* under the name of *M. nutans*, which grew on living stems of *Arundinaria*. He states that it possesses three different kinds of asci. The first contains filamentous septate spores, which are extruded in their undivided condition; this form is rare. The second contains spores which divide into oblong-oval part-spores in the ascus, though they may be extruded in a continuous chain; this is the most usual form. In the third type the "sporenanlage" is filamentous, but divides into part-spores before the formation of a spore wall, and the separate joints develop as independent spores; when ripe the part-spores are oval, or cylindric with truncate or pointed ends.

Rick considers that his new species establishes the validity of Bresadola's genus. But, except for the statements concerning the extrusion of the spores, his description is exactly what would be written by any one who regarded the differences in the asci of *Hypocrella phyllogena* as final stages instead of stages of development. Asci, whose contents could be imagined to answer in every respect to Rick's descriptions, may be found in any collection of *Hypocrella phyllogena* (*Moelleriella sulphurea*). I have examined the specimen of *Moelleriella nutans* in Herb. Berlin (Rick, Fungi Austro-Americani, 89), but was unable to find perithecia or pycnidia in it, and it did not appear to have the structure of *Hypocrella*. Rick describes it as having paraphyses; in that case it differs from *Hypocrella* and from the type of *Moelleriella*.

Systematic Account.

The species of *Aschersonia* may be arranged in two groups, according to the presence or absence of paraphyses. And this feature, as far as the species hitherto known indicate, is correlated with the kind of insect on which the fungus is parasitic. Species parasitic on *Aleyrodidæ* have paraphyses; those parasitic on *Lecaniidæ* do not. It is proposed to take these two groups as subgenera, under the names of *Eu-Aschersonia* and *Leprieuria* respectively. *Eu-Aschersonia* has been selected for the Aleyrodiicolous group, because the type species of the genus *Aschersonia*, *A. taitensis* Mont., possesses paraphyses.

The difference between the corresponding species of *Hypocrella* is not so easily defined. The Lecaniicolous group have, in general, harder, more compact stromata than the *Aleyrodiicolæ*. The stromata of the first group are usually hemispherical, two-thirds globose or scutate, while those of the second are discoid or irregularly flattened pulvinate. The two stages are found in the same stroma, more frequently in the *Lecaniicolæ* than in the *Aleyrodiicolæ*. The type species of the genus *Hypocrella*, *Hypocrella discoidea*, is an Aleyrodiicolous species, and the *Aleyrodiicolæ* may, therefore, be known as *Eu-Hypocrella*. For the harder species of the *Lecaniicolæ* the generic name *Fleischeria* has been proposed by Penzig and Saccardo. While it is not possible to consider hardness as a generic character, the name, as applied by Penzig and Saccardo, denotes a species which differs from *Eu-Hypocrella* in its pycnidial stage by the absence of paraphyses. It is proposed, therefore, to employ the name *Fleischeria* as a subgenus for the species parasitic on *Lecaniidæ*.

List of Species.

As will be evident from the following list, the *Hypocrella* stage of all the known species of *Aschersonia* of the group *Lecaniicolæ* has been determined; their descriptions have consequently been included with the related *Hypocrella*. On the other hand, the *Hypocrella* stage is known in less than half the Aleyrodiicolous species of *Aschersonia*.

The species of *Hypocrella*, with their corresponding *Aschersonia* stages, may be arranged as follows :—

LECANIICOLÆ.

HYPOCRELLA.	ASCHERSONIA.
Subgenus FLEISCHERIA.	Subgenus LEPRIEURIA.
H. palmæ	(Not named)
H. epiphylla ..	*A. cubensis*
H. Reineckiana ..	*A. marginata*
H. caulium ..	—
H. ceramichroa ..	(Not named)
H. cavernosa ..	(Not named)
H. olivacea	(Not named)
H. scutata	—
H. convexa	—
H. bispora	—
H. verruculosa ..	—
H. javanica ..	*A. Coffeæ*
H. Gartneriana ..	—
H. Schizostachyi ..	—
H. botryosa	—
H. Amomi	—
H. nectrioides ..	—
H. turbinata ..	*A. turbinata*
H. phyllogena ..	*A. basicystis*
H. oxystoma ..	*A. oxystoma*

ALEYRODIICOLÆ.

Subgenus EU-HYPOCRELLA.	Subgenus EU-ASCHERSONIA.
H. discoidea ..	*A. samoensis*
H. viridans ..	*A. viridans*
H. palmicola ..	(Not named)
— ..	*A. badia*
— ..	*A. brunnea*
— ..	*A. flava*
— ..	*A. crenulata*
— ..	*A. blumenaviensis*
H. Mollii	*A. confluens*
H. duplex	*A. duplex*

HYPOCRELLA.	ASCHERSONIA.
H. tubulata	(Not named)
—	*Aschersonia columnifera*
—	*Aschersonia acutispora*
—	*A. taitensis*
—	*A. Tamurai*
—	*A. Aleyrodis*
—	*A. hypocreoidea*
—	*A. Goldiana*
—	*A. australiensis*
H. Andropogonis	*A. Andropogonis*
H. Sloaneæ	(Not named)
H. Raciborskii	*Aschersonia placenta*

In the *Lecaniicolæ* the first seven species are usually subglobose and even, though in *H. palmæ*, *H. caulium*, and *H. olivacea* the stroma is sometimes scutate or flattened pulvinate. *H. scutata*, *convexa*, and *bispora* are flattened pulvinate or discoid. *H. verruculosa* and the six following species are tuberculate. *H. turbinata* bears pezizoid discs, at least in its *Aschersonia* stage; *H. phyllogena*, in its typical form, is stud-shaped; and *H. oxystoma* is columnar in its *Aschersonia* stage.

Of the *Aleyrodiicolæ*, *H. discoidea*, *H. viridans*, and *H. palmicola* are typically discoid; their *Aschersonia* stages have regular, more or less globose pycnidia. *A. badia*, *A. brunnea*, *A. flava*, *A. crenulata*, and *A. blumenaviensis* have similar pycnidia, the first four having discoid stromata, while that of the last is somewhat stud-shaped. *H. Mollii* has a flattened pulvinate stroma, sometimes tuberculate, and its pycnidia are regularly oval. *H. duplex* has either simple pulvinate, or compound tuberculate stromata, with regular globose pycnidia. In *H. tubulata*, *A. columnifera*, and *A. acutispora*, the stroma usually bears projecting cylindrical processes. *A. taitensis* and *A. Tamurai* are discoid, the latter tending to flattened pulvinate; their pycnidia have definite ostiola, but are irregular towards the base. The remaining species have flattened pulvinate stromata, with widely-open, irregular pycnidia.

Key to the known Species.

Aschersonia.

I.—No paraphyses in the pycnidium :—

A.—Pycnospores fusoid or narrow-oval, ends not produced :—

(1) Pycnospores, 13–18 × 4–5 μ .. *H. cavernosa*
(2) Pycnospores, 9–14 × 2–3·5 μ .. *A. Coffeæ*
(3) Pycnospores, 6–13 × 1–2 μ :—

(*a*) Stroma minutely verrucose, olive brown .. .. *H. olivacea*
(*b*) Stroma minutely verrucose, red-brown .. .. *H. palmæ*
(*c*) Stroma smooth, fuscous .. *A. marginata*
(*d*) Stroma smooth, scarlet .. *H. ceramichroa*

B.—Pycnospores with prolonged tips :—

(1) Stroma columnar, pycnidial orifice ring-shaped .. .. *A. oxystoma*
(2) Stroma pezizoid or columnar, pycnidium tubular, branching .. *A. turbinata*
(3) Stroma stud-shaped, or flattened pulvinate, with a membranous hypothallus .. .. *A. basicystis*
(4) Stroma two-thirds globose, buff .. *A. cubensis*

II.—Paraphyses present in the pycnidium :—

A.—Stroma discoid : pycnidia regular, globose :—

(1) Stroma red .. .. *A. samoensis*
(2) Stroma white, becoming green .. *A. viridans*
(3) Stroma yellow :—

(*a*) Subrugose, opaque, scarcely constricted at the base .. *A. samoensis*
(*b*) Smooth, opaque, constricted at the base .. .. *A. blumenaviensis*
(*c*) Smooth, subtranslucent .. *A. flava*

(4) Stroma light brown, paraphyses up to 100 μ .. .. *A. badia*

(5) Stroma purple-brown, paraphyses up to 160 μ :—

(*a*) Spores 16–19 μ .. .. *A. brunnea*

(*b*) Spores 10–14 μ .. .. *A. crenulata*

B.—Stroma discoid, pycnidia irregularly oval .. .. *A. taitensis*

C.—Stroma discoid, pycnidia flask-shaped *A. Tamurai*

D.—Stroma pulvinate, pycnidia regular, spore masses distinct :—

(1) Flattened pulvinate ; pycnidia flask-shaped .. .. *A. confluens*

(2) Subglobose ; pycnidium globose, usually solitary .. .. *A. duplex*

E.—Stroma cylindric, or pulvinate with cylindrical processes :—

(1) Pycnospores with prolonged tips .. *A. acutispora*

(2) Pycnospores fusoid :—

(*a*) Pycnidia globose, with a long neck *H. tubulata*

(*b*) Pycnidia cylindric .. *A. columnifera*

F.—Stroma pulvinate, pycnidia irregular, spore masses distinct .. .. *A. Andropogonis*

G.—Stroma pulvinate, pycnidia regular, spore masses confluent :—

(1) Yellow or orange .. .. *A. Tamurai*

(2) Grayish-yellow, translucent .. *A. australiensis*

H.—Stroma pulvinate : pycnidia widely open, irregular, spore masses confluent :—

(1) Spore mass reddish or orange-red :—

(*a*) Paraphyses 40–80 μ .. *A. placenta*

(*b*) Paraphyses 65–100 μ .. *A. Aleyrodis*

(2) Spore mass yellow .. .. *A. Goldiana*

I.—Stroma plane, thin, spore masses confluent :—

(1) Pycnidia widely open, irregular .. *A. hypocreoidea*
(2) No pycnidia, basidia on a central disc .. .. *H. Sloaneæ*

K.—Pycnospores, 4–6 × 1·5 μ .. *H. palmicola*

N.B.—Small specimens of *A. placenta* may have regular pycnidia, and resemble *A. Tamurai*, others may have thin stromata as in *A. hypocreoidea*, from which they differ in the colour of the spore masses.

Hypocrella.

I.—Stroma pezizoid, simple or compound .. *H. turbinata*

II.—Stroma discoid :—

A.—Orange-red or yellow .. *H. discoidea*
B.—White, becoming green .. *H. viridans*

III.—Stroma stud-shaped .. .. *H. phyllogena*

IV.—Stroma two-thirds globose :—

A.—Minutely verrucose :—

(1) Red-brown .. .. *H. palmæ*
(2) Greenish or olive-brown .. *H. olivacea*

B.—Smooth :—

(1) Stroma scarlet, perithecia scattered . *H. ceramichroa*
(2) Stroma scarlet, perithecia in an apical area .. .. *H. caulium*
(3) Stroma yellow or buff, glabrous, becoming fuscous .. .. *H. Reineckiana*
(4) Stroma buff, minutely pruinose .. *H. epiphylla*
(5) Stroma reddish-brown .. *H. cavernosa*

V.—Stroma flattened pulvinate, or scutate :—

A.—Irregularly pulvinate, white or pale yellow .. .. *H. Mollii*
B.—Even, stroma resinous .. *H. scutata*

C.—Even, pale ochraceous .. *H. convexa*
D.—Scutate, scarlet, perithecia in an apical area .. .. *H. caulium*
E.—Scutate, purple-black .. *H. bispora*
F.—Minutely verrucose :—

(1) Chestnut-brown .. .. *H. palmicola*
(2) Olive-brown .. .. *H. olivacea*

VI.—Stroma tuberculate :—

A.—Tubercles pulvinate, stroma subglobose :—

(1) Stroma red .. .. *H. javanica*
(2) Stroma pale yellow, opaque, reddish at the base .. .. *H. duplex*
(3) Stroma pale yellow or whitish, opaque, unicolorous .. .. *H. tubulata*
(4) Stroma pale yellow or whitish, subtranslucent .. .. *H. oxystoma*
(5) Stroma yellow-brown .. *H. verruculosa*

B.—Tubercles developed at the margin of the pycnidial stroma :—

(1) Part-spores 10–16 × 2–3 μ .. *H. Sloaneæ*
(2) Part-spores 8–12 × 2–2·5 μ .. *H. Raciborskii*

C.—Tubercles produced :—

(1) Stroma white or pale yellow, tubercles smooth :—

(*a*) Tubercles cylindric .. *H. Amomi*
(*b*) Tubercles inflated outwards .. *H. botryosa*
(2) Stroma pale yellow, tubercles verrucose .. .. *H. Gartneriana*
(3) Stroma reddish-purple .. *H. Schizostachyi*
(4) Stroma rosy-orange .. *H. nectrioides*

VII.—Stroma pulvinate, with irregular pycnidial cavities ; perithecia embedded in the stroma between the pycnidia .. *H. Andropogonis*

Lecanicolæ.

Hypocrella, subgenus Fleischeria.

Hypocrella palmæ (Berk. & Curt.) Sacc., Syll. Fungorum, II., p. 580 (1883).—Hemispherical, or two-thirds globose, up to 6 mm. diameter, sometimes broadly convex, usually strongly ridged obliquely or horizontally, moderately hard; red-brown, becoming black when old; internally pallid or yellow, purplish towards the exterior in old specimens; surface usually even, sometimes convoluted, or irregularly lobed, rough with projecting ostiola, rarely almost smooth; perithecia usually arranged regularly round the periphery, flask-shaped, 0·3–0·4 mm. long, 0·2 mm. diameter; asci eight-spored, 160 × 8 μ, part-spores cylindric with rounded ends, 5–10 × 1·5–2 μ. Pycnidia globose, 0·2 mm. diameter; pycnospores fusoid, 9–13 × 1–1·5 μ. *Hypocrea palmæ* B. & C., Jour. Acad. Nat. Sci. Philadelphia, New Ser., II., p. 285 (1853); *Hypocrella phyllogena* Speg., Fung. Arg., Pug. IV., No. 209; *Hypocrella Spegazzinii* Sacc., Syll. Fung., II., p. 579, *ex* Speg., Fung. Arg., Pug. IV.; *Hypocrella guaranitica* Speg., Fungi Guar., Pug. I., No. 256; *Hypocrella filicina* Rehm, Hedwigia (1898), p. 200; *Fleischeria paulensis* v. Höhnel, Ergeb. der Bot. Exped. der K. Akad. d. Wissensch. nach Sud Brasilien, 1901, Bd. II., p. 21 (1907); *Hypocrella globosa* Syd. non Rac., Ann. Myc., V., p. 359 (1907); *Hypocrella orbicularis* Syd., in Theissen, Ann. Myc., IX., p. 67 (1911); *Hypocrella phyllophila* Theiss., Ann. Myc., IX., p. 66 (1911); *Hypocrella ambiens* Theiss., Ann. Myc., IX., p. 68 (1911); *Hypocrella Sydowii* Sacc. and Trott., Syll. Fungorum, XXII., p. 503 (1913).

This species has the peculiarity of possessing in the majority(?) of cases a well-defined ridge running horizontally or obliquely round the stroma at varying distances from the base, a feature which occurs to some extent in *Hypocrella olivacea* also. This is apparently caused by the elevation of the scale during the growth of the fungus, its final position being indicated by the ridge. Potash gives a yellow or greenish-yellow extract, but this sometimes fails with old specimens.

The type specimen in Herb. Kew is labelled "*Hypocrea palmæ. Tubercularia palmæ* Schwein. Surinam. Herb. Schwein."; it contains two specimens, 2 and 4 mm. in diameter respectively now detached from the leaf; they are now black, about two-thirds globose, and ridged obliquely; Berkeley gave the colour as red-brown; the surface is irregularly wrinkled or convoluted; internally the colour is purplish (after repeated preserving); the perithecia are arranged regularly round the periphery and the part-spores measure 8–9 × 2 μ. The type specimen of *Hypocrella Spegazzinii* Sacc. is Spegazzini, Fungi Argentini Pugillus IV., No. 209, on *Coutarea mollis*, Brazil; a specimen furnished by Spegazzini is labelled "In foliis coriaceis, Apiahy, May '81. Puiggar"; this is the species listed by Spegazzini (*loc. cit.*) as *Hypocrella phyllogena* (Mont.) Speg., and the herbarium specimen bears that name. The stromata are up to 5 mm. diameter, broadly convex, up to 2 mm. thick in the centre, generally ridged a short distance from the lower margin; they are rough with projecting ostiola, red-brown towards the base, black or blackish-brown above; the perithecia are arranged either regularly round the periphery or at varying depths; in general the stromata are immature, but some contain part-spores 5–8 × 2 μ. The type of *Hypocrella guaranitica* Speg. is Spegazzini, Fungi Guaranitici, Pugillus I., No. 256, on living leaves of *Euphorbiaceæ*, near Villa Rica, Brazil; I have examined the type specimen from Herb. Spegazzini: it is represented in Herb. Kew, Herb. Paris, and Herb. Berlin by "B. Balansa. Pl. du Paraguay, 1878–1884, No. 3546. Feuilles d' Euphorbiaceæ. Santa Barbara, pres de Villa-Rica, Fevrier 1882," which are apparently co-types; the specimens are associated with a *Lecanium;* the Berlin specimens are smoother than those at Kew; they agree with Spegazzini's description, but are *Hypocrella palmæ.* The type specimen of *Hypocrella orbicularis* Syd. (= *Hypocrella globosa* Syd., name antedated) in Herb. Berlin, "Brazil. Prov. S. Paulo. Leg. F. Noack. Comm. P. Sydow" has part-spores 6–10 × 1·5–2 μ; old specimens are purplish internally near the periphery; the stromata vary in roughness, some being almost smooth; they are associated with a *Lecanium: Hypocrella Sydowii* Sacc. & Trott. is merely another re-naming of the same gathering. *Hypocrella filicina* Rehm, type specimen "E. Ule. Herbarium Brasiliense, No. 857, on *Blechnum* sp. Estado de Sta. Catharina, Blumenau, July, 1888," in Herb. Berlin, is immature, but is evidently *H. palmæ:* the co-type in Herb. British Museum does not contain any fungus, except a slight covering on one *Lecanium. Hypocrella phyllophila* Theissen, type *ex* Herb. Theissen, on leaves of *Myrtaceæ*, Sao Leopoldo, Rio Grande do Sul, contains only small specimens which do not differ from *Hypocrella guaranitica. Hypocrella ambiens* Theiss, "G. Rick, 1906, Sao Leopolda, Brazil," *ex* Herb. Theissen, contains large black specimens, up to 10 mm. diameter, minutely roughened, the ostiola scarcely projecting; the perithecia are more crowded than usual in a well-defined cortical zone; the specimens have been hollowed out by some

insect. *Fleischeria paulensis* v. Höhnel, on twigs of a *Melastomaceæ*, Sao Paulo, Cantareira, type *ex* Herb. v. Höhnel, is quite indistinguishable from *H. ambiens*. Specimens from Venezuela *ex* Herb. Thaxter (Coll. A. F. Blakeslee) are bright brownish-red ; they are tuberculate towards the base.

Pycnidia have not been found in any of the specimens cited above. In a collection from Trinidad (*ex* Herb. Thaxter) some of the examples contain both pycnidia and perithecia, the former near the margin, and the latter in the centre ; the pycnidia are globose, 0·2 mm. diameter, and the pycnospores are fusoid, 9–13 × 1–1·5 μ. The specimens are circular, scutate, or flattened pulvinate, up to 4 mm. diameter, and 1 mm. thick in the centre ; most of them thin out to a margin about 0·1 mm. thick, but some are 0·7 mm. thick at the edge ; the colour is now black, but sections show a yellow-brown deposit beneath the black exterior. These are on a large flat *Lecanium*, and their shape is strikingly similar to that of *H. olivacea* under the same conditions. In Herb. Kew, *sub Aschersonia oxyspora*, there is a leaf bearing *Aschersonia turbinata*, collected by Spruce at San Carlos and recorded by Berkeley under the former name in Hooker's Journal of Botany and Kew Garden Miscellany, VIII. (1865), p. 278. Among these is a specimen which appears to be the *Aschersonia* stage of *H. palmæ*. It is black, semiglobose, slightly contracted at the base; it is situated excentrically on the scale and consequently the base is expanded on one side ; the surface is minutely roughened ; internally it is now purplish-fuscous ; the pycnospores are fusoid, ends not tapering, 8–10 × 2 μ.

Distribution.—Surinam, type in Herb. Kew. Venezuela, in Herb. Thaxter. Brazil, *Hypocrella Spegazzinii* Sacc., in Herb. Spegazzini; *Hypocrella guaranitica* Speg., in Herb. Spegazzini, Herb. Kew, Herb. Paris, and Herb. Berlin; *Hypocrella orbicularis* Syd., in Herb. Berlin ; *Hypocrella filicina* Rehm, E. Ule 857, in Herb. Berlin; *Hypocrella phyllophila* Theiss., in Herb. Theissen ; *Hypocrella ambiens* Theiss., in Herb. Theissen ; *Fleischeria paulensis* v. Höhnel, in Herb. v. Höhnel. Trinidad, in Herb. Thaxter.

Figures.—Plate 2, fig. 1., specimen *ex* type of *Hypocrella globosa* Syd., in Herb. Berlin, × 6; Plate 4, fig. 1, section of specimen *ex* type of *Fleischeria paulensis* v. Höhnel, × 3 ; Plate 4, fig. 2, section of specimen *ex* type of *Hypocrella globosa* Syd., × 3 ; Plate 5, fig. 54, perithecium, × 100; Plate 5, fig. 55, apex of ascus and spores, × 600 ; Plate 5, fig. 57, part-spores, × 900.

Hypocrella olivacea Petch.—Stromata two-thirds globose or conico-pulvinate, or flattened convex, up to 5 mm. diameter and 3 mm. high, sometimes ridged horizontally or obliquely near the base, minutely verrucose ; moderately hard ; at first greenish-yellow, then olive-brown, or dark rufous brown, finally blackening ; internally pale yellow or white, with a brown zone at the periphery. Ostiola scattered, projecting.

Perithecia flask-shaped, with a long neck, up to 0·5 mm. deep, 0·2–0·25 mm. diameter; asci 120–140 × 8–9 μ; part-spores cylindric, becoming oblong-oval, 5–8 × 1·5–2 μ. Pycnidia flask-shaped or oval, 0·25 mm. deep, 0·2 mm. diameter, immersed, or with the apex in a projecting point; pycnospores fusoid, sharply pointed, 8–11 × 1·5 μ. *Fleischeria sclerotioides* v. Höhnel, Fragmente zur Mykologie, VIII. Mitt., p. 26 (1909); *Hypocrella scutata* Auctt., non Cooke.

This species occurs in two well-defined forms, according to the type of *Lecanium* on which it is growing. On pulvinate scales, such as *Lecanium nigrum*, it takes the two-thirds globose or conico-pulvinate form of *H. Reineckiana*, from which it is distinguished by its colour and minutely verrucose surface. But on large flat scales it may be scutate, only slightly elevated in the centre. This latter form appears to have been generally recorded under the name of *Hypocrella scutata*, *e.g.*, by Penzig and Saccardo, Icones Fungorum Javanicorum, judging from their figure. The brown internal zone appears to be well-developed only when the perithecia are formed. Pycnidia and perithecia occur commonly in the same stroma. It gives a yellow or yellow-brown extract with potash. It resembles *Hypocrella palmæ*, in that the scale is frequently lifted off the leaf by the growth of the fungus, its position being subsequently indicated by a ridge round the stroma; on the scutate stromata this sometimes results in the production of a definite vertical margin, about 0·5 mm. high.

This species has been well described by von Höhnel under the name of *Fleischeria sclerotioides*, from specimens on a scale insect on *Ficus*, Tjibodas, Java, the name being based on the supposition that it was the ascigerous stage of *Aschersonia sclerotioides*. But from specimens kindly lent me by Prof. von Höhnel, it is clear that these are identical with the present species, which is not connected with *Aschersonia sclerotioides*.

In Herb. Berlin specimens of the *Aschersonia* stage on *Morus indica* and *Mimosa sensitiva*, from Amani, and on *Acacia Lebbek* from Ngamba, are included under *Aschersonia sclerotioides*. It is common in Ceylon in the neighbourhood of Hakgala (5,600 feet) on *Lecanium oleæ* on *Allophylus zeylanicus*, in company with *Hypocrella javanica* and *Hypocrella Reineckiana*; it has also been found on *Paralecanium calophylli* on *Myristica*, Hakgala, and on the same insect on *Eugenia* sp., Namunukuli.

In my preliminary paper this species was referred to as *Hypocrella marginata*, on the supposition that its *Aschersonia* stage was identical with *Aschersonia marginata* E. & E. A re-examination of the specimens has, however, shown that *Aschersonia marginata* is identical with *Aschersonia sclerotioides*, and is consequently the *Aschersonia* stage of *Hypocrella Reineckiana*.

Distribution.—Java, Herb. von Höhnel. East Africa, Herb. Berlin. Ceylon, Herb. Peradeniya.

Figures.—Plate 2, fig. 2, flattened form, Ceylon, × 5; Plate 2, fig. 3, subglobose form, Ceylon, × 5; Plate 4, fig. 24, section, Ceylon, × 3; Plate 4, fig. 25, section, Ceylon, × 4; Plate 4, fig. 26, section, Ceylon, × 4; Plate 5, fig. 62, pycnospores, × 1000.

Hypocrella epiphylla (Massee) Sacc., Sylloge Fungorum, XI., p. 368 (1895).—Pycnidial stroma 1–4 mm. diameter; in small specimens hemispherical, or subconoid, or subcylindric, with a single depressed pycnidial orifice at the apex, usually filled with a red-brown mass of spores, upper edge of stroma rounded; in large specimens, two-thirds globose with up to a dozen scattered, sunk, pycnidial orifices; white or buff, or reddish-brown, internally white or yellowish; minutely pruinose. Pycnidium in the small stromata globose, sometimes widely open, even or convoluted; in the larger stromata, irregular, expanded and flattened parallel to the surface, or tubular and branching; pycnospores fusoid, ends tapering and sharply pointed, 10–14 × 3–4 μ. Perithecial stromata sub-hemispherical or two-thirds globose, even or sub-tuberculate, buff or reddish-brown, up to 2 mm. diameter; ostiola red-brown, not projecting; no hypothallus; perithecia flask-shaped with a long neck, 0·4–0·6 mm. deep, 0·2 mm. diameter, scattered; part-spores cylindric or oval, 8–12 × 4 μ. *Hypocrea* (*Clintoniella*) *epiphylla* Mass., Jour. of Botany, 1892, p. 164, t. 333, figs. 27–30. *Aschersonia* stage—*Aschersonia cubensis* Berk. & Curt., Jour. Linn. Soc., X., p. 351 (1869); *Aschersonia amazonica* P. Henn., Hedwigia (1904), p. 338; *Aschersonia consociata* P. Henn., Hedwigia (1904), p. 338.

The type specimen of *Hypocrea epiphylla* Mass. was collected on leaves of *Dieffenbachia*, Morne Cochon, St. Vincent, by W. R. Elliott. Massee stated that it is "tomento albo basi circumdata"; some of the specimens show that feature, but it is due to a mould which spreads over the fungus and the leaf in a circular patch up to 5 mm. diameter. The specimens examined contained immature pycnidia as well as perithecia, and from the original description, which gives the spores as 50–55 × 1–5 μ, it is evident that mature ascospores were not seen. In a collection of *Aschersonia cubensis* from Trinidad, *ex* Herb. Thaxter, one specimen is perithecial; it is reddish-brown, slightly tuberculate; the perithecia contain loose spores, which are apparently part-spores some of which have germinated and partly filled the cavity with hyphæ; the part-spores are cylindric with rounded ends, or narrow-oval, and measure 8–12 × 4 μ. It is probable that *Hypocrella verruculosa* is identical with *H. epiphylla*, but no

specimens of the latter have been found so tuberculate as that figured by Möller for the former species.

Though *Hypocrella epiphylla* is rare, its *Aschersonia* stage, *A. cubensis*, appears to be common in the Western tropics. The type specimen in Herb. Kew, on *Pteris*, Cuba, contains small stromata, generally with one pycnidium, but in some cases two ; Herb. Paris contains part of the same gathering (Curtis 427). *Aschersonia amazonica* P. Henn., type in Herb. Berlin, on leaves and stems of *Bignoniaceæ*, Iquitos (Ule 3208), contains small specimens, 1·5 mm. diameter, with one pycnidium, and others 4 mm. diameter with up to a dozen ; it is on a *Lecanium*. Under the same name, in Herb. Berlin, is another gathering on *Psychotria*, Rio Negro, Manaos ; most of these specimens have a single pycnidium ; it is on *Lecanium hemisphericum*. *Aschersonia consociata* P. Henn., type in Herb. Berlin, on *Davilla*, Brazil (Ule 2889), contains a single specimen of *A. cubensis* with numerous pycnidia. C. F. Baker, 222 b, on *Cordia umbraculifera*, Para, Brazil, *sub Aschersonia sclerotioides* in Herb. Berlin, is *A. cubensis*.

Specimens of this species have been sent me by H. S. Fawcett, on *Lecanium* (*? hesperidum*) on *Persea carolinensis*, Florida ; and by F. W. South, on *Lecanium* (*? mangiferæ*) on Guava, mixed with *A. turbinata*, Trinidad. From Prof. Thaxter, I have received specimens from Grenada, Florida, and Trinidad.

Small subcylindrical specimens of the *Aschersonia* may be confused with small specimens of *Aschersonia turbinata*, but they may be distinguished by the rounded upper edge of the stroma and the shape of the pycnospores. Large specimens resemble *Hypocrella cavernosa* in structure, but differ in the smaller spores with more tapering points, and the sunken pycnidial orifices. Potash stains a section purple here and there in isolated patches.

Distribution.—St. Vincent (*H. epiphylla*), in Herb. British Museum. Florida, in Herb. Peradeniya, and Herb. Thaxter. Grenada, in Herb. Thaxter. Trinidad, in Herb. Thaxter. Cuba (*Aschersonia cubensis*), in Herb. Kew and Herb. Paris. Brazil, in Herb. Berlin (*A. consociata* and *sub A. sclerotioides*). Peru, in Herb. Berlin (*A. amazonica*).

Figures.—Plate 3, fig. 24, *Aschersonia cubensis*, Florida specimen, × 6 ; Plate 3, fig. 28, specimen *ex* type, × 8 ; Plate 4, fig. 9, section of *Hypocrella*, × 6 ; Plate 4, fig. 31, section, *Aschersonia cubensis*, simple form, × 6 ; Plate 4, fig. 32, section, *Aschersonia cubensis*, compound form, × 3.

Hypocrella Reineckiana P. Henn., Engler's Bot. Jahrbuch, XXIII., p. 286 (1896).—Hemispherical, or two-thirds globose, or conico-pulvinate, up to 4 mm. diameter ; moderately hard ; at first pale yellow, or buff, becoming fuscous or slate-coloured with a glaucous bloom, finally black ; internally pale yellow or whitish ; usually smooth, glabrous, even, sometimes furrowed or convoluted. Pycnidia scattered, orifices yellow-brown or red-brown, usually sunk, flask-shaped or lobed, or

tubular, sometimes extending to the middle of the stroma ; pycnospores fusoid, ends pointed, 6–10 × 1·5–2 μ. Perithecia scattered, flask-shaped, ostiola rarely projecting, up to 0·3 mm. deep, 0·15 mm. diameter, colour as the pycnidial orifices ; asci 170–180 × 8 μ, eight-spored ; part-spores cylindric, 6–8 × 1–1·5 μ. *Hypocrella Pernettyæ* Pat., Ann. Bot. Jardin Buitenzorg, 1st Supplement, p. 125 (1897) ; non *Fleischeria sclerotioides* v. Höhnel, Fragmente zur Mykologie, VIII. Mitt., p. 26 (1909) ; *Hypocrella melæna* Syd., Philippine Jour. of Sci., VIII. C, p. 494. *Aschersonia* stage—*Aschersonia marginata* E. & E., Bull. Torrey Bot. Club (1895), p. 436 ; *Aschersonia sclerotioides* P. Henn., Hedwigia (1902), p. 146 ; *Aschersonia pisiformis* Pat., Bull. Soc. Myc. France, XXII., p. 59 (1906).

This is the common species on *Lecanium* in Ceylon, and apparently in the Eastern tropics generally. It resembles *Hypocrella cavernosa* Möll. in its tubular pycnidia, but this feature is not constant. The *Hypocrella* stromata, as a rule, contain pycnidia also, but the species is most frequently found in the *Aschersonia* stage, *i.e.*, with pycnidia only.

In the type of *H. Reineckiana* in Herb. Berlin, on petioles, stems, and leaves of some climbing *Rhaphidophora*, Upolu, the stromata are ochraceous, closely dotted with brown perithecial ostiola, which do not project ; they are about 2 mm. diameter, not 3 centimetres as stated by Hennings ; the perithecia are arranged regularly round the periphery (in section), and are 0·25–0·3 mm. deep. and 0·12–0·15 mm. diameter ; the part-spores, in the ascus, measure 6–8 × 1 μ ; the stromata also contain pycnidia, 0·2 mm. diameter and 0·3 mm. deep, lobed below ; the pycnospores are not quite mature and measure 6–10 × 0·75–1 μ, In *Hypocrella Pernettyæ*, on leaves of *Pernettya repens*, Java, type *ex* Herb. Patouillard, the specimens are now clay-coloured ; they are smooth and subglobose but some have been eaten away at the top by insects ; the stromata contain pycnidia as well as perithecia ; they are associated with a *Lecanium*.

Aschersonia marginata is represented in Herb. Kew, Herb. British Museum, and Herb. Berlin by parts of the type collection, " Plants of the Hawaiian Islands, collected on the Island of Oahu, in and on the slopes of Makiki. On *Pisidium Guayava*, 1945." These are on a *Lecanium*. In all the collections the specimens are old and black ; the pycnidial orifices are scattered, most of them near the base, with the edge recurved and lacerated, as is usual in old specimens ; the stromata are only "margined" when they are situated eccentrically on the scale, so that the latter projects on one side. The potash extract is brownish-yellow. The pycnidia are oval or tubular, some of the latter penetrating almost to the base of the stroma. The pycnospores measure 7–10 × 1·5 μ ;

but in some pycnidia they are only 5 × 1·5 μ ; this reduction in size is probably to be associated with the age of the stroma. *Aschersonia sclerotioides* P. Henn., on *Castilloa elastica*, Java, type in Herb. Berlin, is associated with *Lecanium oleæ ;* the stromata are two-thirds globose, smooth, vertically furrowed towards the base, up to 3 mm. in diameter and 2·5 mm. high, slate-coloured, with numerous pycnidia situated near the base ; the pycnospores are narrow-oval, 6–8 × 1·5–1·75 μ ; none of the other gatherings under this name in Herb. Berlin are this species ; the specimens from East Africa, on *Morus indica* and *Mimosa sensitiva*, Amani, and on *Acacia Lebbek*, Ngamba, are the *Aschersonia* stage of *Hypocrella olivacea.* Puttemans 788, included under *A. sclerotioides* in Herb. Berlin, is *Hypocrella cavernosa*, while "C. F. Baker, 222 b, Para, Brazil," in the same cover in Herb. Berlin is *Aschersonia cubensis. Aschersonia pisiformis* Pat., "sur des coccides parasites des feuilles de cocotier, Tahiti. Leg. Seurat," is represented in Herb. Paris and Herb. Patouillard ; it is on a *Lecanium ;* the specimens are blackened, but from one example they were apparently clay-coloured or buff when young ; the stromata in some cases do not completely enclose the scale, but leave a margin which is only slightly covered by the fungus ; hence the "inferne marginato" of the original description, which is an accidental feature ; some of the stromata are rough.

Specimens in Herb. Peradeniya include the following :—On *Lecanium marsupiale*, Ceylon, and C. A. Barber No. 974, India ; on *Lecanium oleæ on Allophylus zeylanicus*, Ceylon ; on *Lecanium nigrum* on *Hevea*, Ceylon (several collections) ; on *Lecanium* sp. on *Amomum*, Ceylon ; on *Calophyllum Walkeri* (Parkin, pp. 39, 40) ; on *Lecanium tessellatum* on *Litsea zeylanica ;* on *Citrus ;* on *Lecanium* sp. on *Garcinia ;* on *Lecanium* on *Gelonium lanceolatum* (Parkin's species, p. 40) ; on *Lecanium* on *Tabernæmontana ;* on *Lecanium* on Nutmeg ; on *Lecanium hemisphæricum* on *Jacquinia aristata ;* on *Lecanium psidii* on Nutmeg (Parkin B. 1, p. 39) ; on *Lecanium* on *Samadera indica ;* on *Lecanium* on *Loranthus.*

Hypocrella melæna Syd., co-type *ex* Bureau of Science, Manila, examined, contains old, black specimens, flatter than usual ; they yield a yellow-brown extract with potash, but are too smooth for *H. olivacea*, to which one might be inclined, in the present state of the specimens, to refer them.

Specimens from Japan and Formosa recorded by Miyabe and Sawada as *Aschersonia marginata* are this species. One collection on *Psidium Guayava*, Giran, Formosa, Feb. 29, 1908, was said to be on *Parlatoria zizyphi* Lucas, but there is also a *Lecanium* present. Another collection, on *Citrus nobilis*, Kagoshima, Kiusiu, Japan, May, 1903, is also said to be on *Parlatoria.*

The colour with potash is variable ; some specimens are tinged purple, others are not coloured. In old specimens the stroma may turn yellow-brown round the perithecia and yield a yellow-brown extract. In one gathering none of the stromata yield any extract with potash, except one old specimen, over-run with *Meliola*, which gives a vivid violet colour. In a large number of Ceylon gatherings the hyphæ are filled with a deep yellow plasma,

but these do not differ in other respects from stromata in which the contents of the hyphæ are colourless ; the former, which are the more highly coloured internally, give no colour with potash.

The glaucous " bloom " on the surface of the young stroma is due, as remarked by Parkin, to the development of a surface layer of scattered conidiophores and conidia ; the conidiophores are about 12 μ long, and the conidia smaller (5–8 × 1–1·5 μ) than those in the normal pycnidia.

Distribution.—Ceylon, in Herb. Peradeniya. India, in Herb. Peradeniya. Java, in Herb. Patouillard (*H. Pernettyæ*); in Herb. Berlin (*A. sclerotioides*). Sandwich Islands (*Aschersonia marginata*) in Herb. Kew, Herb. British Museum, and Herb. Berlin. Tahiti, in Herb. Paris and Herb. Patouillard (*A. pisiformis*). Solomon Islands, in Herb. Peradeniya. Upolu, in Herb. Berlin (*H. Reineckiana*). Philippines (*H. melæna* Syd.), in Herb. Peradeniya. Formosa and Japan, in Herb. Sapporo (*sub A. marginata* E. & E.) Madagascar, on *Lecanium coffeæ*, in Herb. Peradeniya (Coll. d' Emmerez de Charmoy).

Figures.—Plate 2, fig. 14, Ceylon specimen, damaged on one side and showing the internal colour of the stroma, × 6 ; Plate 2, fig. 15, *Aschersonia*, young, with superficial conidia, Ceylon, × 6 ; Plate 2, fig. 23, old *Aschersonia*, blackened externally, partly in section and showing tubular pycnidia, Ceylon, × 4 ; Plate 4, fig. 10, section showing perithecia and tubular pycnidia, × 3 ; Plate 4, fig. 11, section, showing perithecia, × 6.

Hypocrella caulium (B. & C.) Pat., Bull. Soc. Myc. France, XXX. (1914), p. 346. Stromata two-thirds or three-fourths globose, sometimes subturbinate, often confluent, up to 5 mm. diameter, hard ; brick-red, scarlet, or cinnabar below, dark red, surrounded by a paler yellowish-white border, at the apex ; pulverulent below ; internally yellowish. Perithecia situated in the upper dark red area, crowded, oval, 0·3 mm. deep, 0·1 mm. diameter, neck long or short, ostiola not projecting ; asci 180–250 × 3·5–4.5 μ (Hennings) ; part-spores immature, 12–15 × 0·3 μ (Hennings). Var. *brasiliana* Hennings, Hedwigia, XLIII., p. 85. Stromata scutate, up to 1 cm. diameter, circular, the central portion evenly convex or nodular, about 3 mm. diameter and 2 mm. thick, rapidly thinning into the broad flatter margin ; margin fimbriate ; brick-red, orange-red, or pinkish-red, central boss ochraceous at the apex and cracked ; internally dingy yellow, with a red peripheral zone about 0·25 mm. deep ; substance rather soft. Perithecia crowded, in the apical ochraceous area : asci, 170–250 × 4–7 μ, eight-spored (Hennings). *Corticium*

caulium B. & C., Jour. Acad. Sci., II. (1853), p. 279. *Hypocrella camerunensis* P. Henn., Engler's Bot. Jahrb., XXIII., p. 540 (1897).

This, though a large species, appears to be usually found on twigs 4–6 mm. in diameter, and therefore almost completely surrounds them. In some cases adjacent stromata are fused into a continuous mass surrounding the twig, while in others the specimens consist only of a thin, barren stroma. The type specimen from Lolodorf (Staudt No. 214, April 14, 1895), on stems of some climber, in Herb. Berlin, consists of stromata of the normal lecaniicolous type, or rather more globose than usual; some of the stromata are fused together, in one case into a tuberculate mass 1·75 cm. long, and 7·5 mm. broad, bearing isolated, dark red, light-bordered areas which contain the perithecia. The perithecia are situated at two different depths, *i.e.*, more or less in two layers; those of the lower layer have correspondingly longer necks. These specimens are associated with *Stictococcus Sjostedti* Ckll. Another specimen in Herb. Berlin, from Bipindi, Cameroons, is encrusting, glabrous, thin, of uniform thickness, and sterile. Another collection from Lolodorf (Staudt, 23.3.95) contains scutate specimens, like var. *brasiliana* in form, but glabrous. The specimens examined by me were immature. With potash, the exterior turns purple, but the interior does not colour. Var. *brasiliana* is represented in Herb. Berlin and Herb. Kew by parts of the type collection, Ule 2613, on stems of *Eupatorium* sp., Rio de Janeiro. The Kew specimens are apparently barren. Ule 3036, on *Strychnos*, Rio Negro, in Herb. Berlin, contains sterile, slightly scutate specimens, which are glabrous. Puttemans 708, San Paulo, on a Composite, resembles Ule 2613; the surface is powdery, but the centre is still brick-red; the ochraceous centre of the more mature specimens appears to be due to the breaking up of the surface of the stroma, and consequent exposure of the internal tissue, on the development of the perithecia. A specimen from Costa Rica, in Herb. Berlin, matches Puttemans 708. There are also two collections on *Vismia*, from Para., in Herb. Berlin; one of these, collected by Dr. Huber, is glabrous, encrusting, and effused, like the Bipindi specimen; the other, collected by C. F. Baker, is encrusting, circular, scutate, and glabrous; both collections are sterile.

Some of the sterile forms resemble a coating of scarlet sealing wax on the stem; they have the normal *Hypocrella* hyphæ, and give the same reactions with potash as the fertile forms of *H. camerunensis*. There does not seem to be any reason to doubt their relationship. Patouillard has recently discovered (Bull. Soc. Myc. France, XXX., p. 346) that this sterile stroma was described as *Corticium caulium* Berk. & Curt. from specimens from Surinam. The species therefore becomes *Hypocrella caulium* (B. & C.) Pat., at least as far as the American form is concerned. It is probable that when riper material and the *Aschersonia* stages are available, the American and African species will be found to be distinct.

In Herb. Montagne there is a collection from Guiana, *Aschersonia guianensis* Mont. (Ann. Sci. Nat., Ser. 3, vol. II., p. 122), which probably represents the *Aschersonia* stage of this species. It is labelled, on the exterior of the envelope, "*Aschersonia guyanensis* Montg., ad folia. Guiana. Leprieur," while inside is the inscription, "Sphæria ? floccis luteis contextis intricatis, conidiis minutissimis inspersis. Sporidiis non investigatis. Ad folia. D. Leprieur." There are two specimens of the *Aschersonia*, with a large *Lecanium* on the same leaf. They are brick-red, yellow within, conico-convex, or convex, apex flattened, up to 4 mm. diameter and 1·5 mm. high. The ostiola are in general arranged more or less regularly round the stroma on the sloping face, towards the margin; they are oval, very large, and vertically elongated; some, however, are situated on the flattened apex of one specimen. The specimens appear to be sterile. Montagne stated that he had not been able to find the spores.

Distribution.—(Type)—Cameroons, Lolodorf, and Bipindi, in Herb. Berlin. Var. *brasiliana*—Brazil, Ule 2613 in Herb. Berlin and Herb. Kew; Ule 3036, Puttemans 708, Dr. Huber on *Vismia*, Para, Baker on *Vismia*, Para, in Herb. Berlin. Costa Rica in Herb. Berlin. Surinam in Herb. Kew (*Corticium caulium*). ? Guiana in Herb. Montagne.

Figures.—Plate 2, fig. 10, *ex* type of *Hypocrella camerunensis*, × 5; Plate 2, fig. 13, *ex* var. *brasiliana*, × 2; Plate 4, fig. 12, *Hypocrella camerunensis*, section, × 3; Plate 4, fig. 13, var. *brasiliana*, section, × 4.

Hypocrella ceramichroa (B. & Br.) Petch.—Stromata 1·5–10 mm. diameter, and up to 5 mm. high, two-thirds globose, or hemispherical, or conico-pulvinate with an expanded base, smooth, or, in large specimens, irregularly furrowed; hard; scarlet, dotted with slightly projecting black or dark ostiola, internally yellowish with a red peripheral zone; glabrous. Perithecia scattered, flask-shaped with a long neck, up to 0·6 mm. deep and 0·25 mm. diameter; asci 170–180 × 8 μ; part-spores narrow-oval, ends obtuse, 6–8 × 1·5–2 μ. Pycnidia scattered, cylindric or oval; pycnospores narrow-oval, ends pointed but not tapering, 6–8 × 2 μ. *Hypoxylon ceramichroum* B. &. Br., Jour. Linn. Soc., XIV., p. 120 (1873); *Glaziella ceramichroa* (B. & Br.) Cooke, Grevillea, XI., p. 83 (1883); *Hypocrella ceramichroa* (B. & Br.) Petch (in part), Ann. Perad., IV., pp. 427–431.

Part of the type specimen of this species (Thwaites 1092) is in Herb. Kew, and the remainder in Herb. Peradeniya. It was collected on a *Lecanium* on the stem of a *Smilax* at Peradeniya. The majority of the specimens are immature; the stromata are hemispherical or two-thirds globose, smooth, irregularly furrowed

in the case of the largest; they are now deep red-brown, but, according to Berkeley and Broome, were originally scarlet. A second gathering of this species has been made on *Lecanium expansum* on *Schumacheria alnifolia*, Maskeliya, Ceylon (Parkin, Hypocrella No. 1, p. 29); these are conico-pulvinate with an expanded base, scarlet, dotted with black ostiola; they contain both perithecia and pycnidia. Parkin noted that the colour varied, the rim being nearer red and the crown nearer yellow; that would bring the species into line with *H. caulium*, but it is evident that that description was based on a specimen in which the crown had been damaged and the internal tissue exposed. Potash gives a purple extract.

The description of *H. ceramichroa* in Ann. Perad., IV., pp. 427–431, includes, in error, several details which relate to *Hypocrella Reineckiana*.

Distribution.—Ceylon, in Herb. Kew and Herb. Peradeniya.

Figures.—Plate 2, fig. 12, Ceylon specimen, × 4; Plate 4, fig. 27, section of type specimen, Ceylon, × 3; Plate 4, fig. 28, section, Ceylon specimen, × 3.

Hypocrella cavernosa Möller, Phycomyceten und Ascomyceten (1901), p. 299.—Stroma globose, smooth, light reddish-brown, hard, internally white, about 1 cm. diameter. Pycnidia tubular, branching, labyrinthiform below; conidia elongated fusiform, 20 × 6 μ, hyaline, reddish in mass. Perithecia scattered, deeply sunk, elongated flask-shaped, 425 μ deep, 125 μ diameter, neck 200 μ long. Ascus 170 μ long. Part-spores oval, 10–12 × 4 μ.

The above description is from Möller, *loc. cit.* The type specimen, which I have not seen, is said to be included in the spirit collection in Herb. Berlin. In a slide kindly lent me by Prof. Möller, the pycnidia appear circular, oval, or with convoluted outline in section; the pycnospores measure 13–18 × 4–5 μ, exceptionally 12 × 6 μ; there are also immature, vacuolated conidia, 12 × 2–2·5 μ. The part-spores are cylindric with rounded ends, becoming oval with truncate ends, 8–14 × 3·5 μ; immature cylindric spores may measure only 7 × 3 μ.

This species is remarkable for the large size of its pycnospores. It has not been recorded again, and it is not represented by any other gathering under this name in any herbarium. But several collections of, apparently, this species have been included under *Aschersonia marginata*, &c. "E. Ule. Herbarium Brasiliense, 2627" is included under *Aschersonia marginata* in Herb. Kew and Herb. Berlin; the stromata are smooth, hard, black, covered with a greenish-yellow "bloom," which apparently consists of the conidiophores of an *Aspergillus*; the pycnidia are irregular, and the conidia measure 10–16 × 2–2·5; the internal structure is that of *H. cavernosa*, and similar spores occur on Möller's slide. "Ule, Serra do Ouro Peto, 1892," *sub A. marginata* in Herb.

Berlin, has stromata two-thirds globose, up to 3 mm. diameter, hard, smooth, red-brown becoming black ; it is unripe, but shows tubular or irregular pycnidia penetrating to the middle ; it appears to be immature *H. cavernosa*. " Puttemans, 788, on dead branches, Serra da Cantareira," *sub Aschersonia sclerotioides* in Herb. Berlin, has stromata similar to Ule 2627 and contains immature asci.

A collection made by Thaxter in Trinidad consists of the *Aschersonia* stage only. Some of the specimens are small, flattened pulvinate, irregular, and somewhat effete. The larger specimens are subhemispherical, 3 mm. diameter, even or convoluted. They are now grayish-white, becoming purple-black ; white internally. The pycnidial orifices are blackish, becoming lacerated when old. The pycnidia are tubular, either short, about 0·4 mm. deep, simple or convoluted at the base, or penetrating deeper and appearing as circular or oval cavities in section. The pycnospores are smaller than in the type and measure 10–14 × 4–5 μ.

In Herb. Berlin there is a specimen, *sub Hypocrella luteo-olivacea* Winter, labelled " Brasilia : Prov. Sao. Paulo ; auf *Myrtaceæ* sp. Leg. F. Noack. Comm. P. Sydow." The stromata match those from Trinidad, but are perithecial. They are subglobose, convoluted, up to 3 mm. diameter, dirty white, with brown ostiola, which do not project ; they are hard, and white internally. The perithecia are flask-shaped, up to 0·45 mm. deep and 0·15 mm. diameter ; the wall of the perithecium is yellow. The part-spores are oval, 9–12 × 3–4 μ. This appears to be the *Hypocrella* form of *H. cavernosa*.

Distribution.—Brazil, in Herb. Kew and Herb. Berlin. Trinidad, in Herb. Thaxter.

Figures.—Plate 2, fig. 4, *Aschersonia* stage, viewed from above, Trinidad specimen, × 6 ; Plate 4, fig. 14, section, after Möller, × 1½.

Hypocrella scutata (Cooke) Sacc., Michelia, I., p. 580 (1878). —Circular, up to 1 cm. diameter, flattened convex, up to 2 mm. thick in the centre, margin acute or obtuse, surface even, glabrous, pale-brown, dotted with red-brown ostiola, or dark brown in herbarium specimens ; colour " bright ochraceous orange " when fresh ; substance resinous, fracture vitreous ; hypothallus when present, membranous, translucent ; lower surface flat, translucent yellow-brown, marked with a central, yellowish, opaque spot from which radiate numerous, frequently anastomosing, yellow lines. Perithecia rather deeply sunk, flask-shaped or laterally compressed, up to 0·8 mm. deep ; asci. 400–500 × 8–10 μ, cylindric, eight-spored ; part-spores cylindric with rounded ends, 3–6 × 1·5 μ. *Hypocrea scutata* Cooke, Grevillea, VII., p. 14 (1878).

The type specimen of this extraordinary species was collected on *Myristica* at Singapore by Dr. J. Bancroft. A note on the type specimen reads " Substance melts by heat like lac ; supposed to be the result of bite of coccus, as a black fungus covers the tree. J. Bancroft of Brisbane, Australia, January, 1878." The type is now at Kew, where there is another specimen from Singapore, collected by Ridley, June 26, 1908. I have also a specimen from the Philippines, on *Dillenia philippinensis* Rolfe, Mt. Maquiling, Province of Laguna, Luzon, No. 7149, E. D. Merrill, September, 1910, kindly sent by Dr. Merrill. It has been recorded for Ceylon by Cesati, collected by Beccari, and for Java by Penzig and Saccardo, but both these records more probably relate to the flat form of *Hypocrella olivacea*. I have searched for it on *Myristica* in Ceylon without any success.

Cooke's figure in Grevillea erroneously shows the stroma turned up at the margin ; in all the available specimens the base is quite flat and closely applied to the leaf. The stroma is subtranslucent and breaks with a vitreous fracture. It is evidently composed chiefly of resin, and if a section is placed in alcohol large quantities of resin are dissolved out. The first observer of it noted that it melted like lac. The fungus element of the stroma is a spongy mass, and consists of numerous " pockets," which are filled with resin. The reticulated pattern seen on the base is formed by the walls of these pockets, and a similar pattern is seen in the cross section. It would appear probable that this resin is derived from the scale insect, and that the peculiar characters of this species are due to the insect on which it is parasitic. Such a structure might conceivably be produced by the growth of a *Hypocrella* on one of the lac insects. The remains of a scale insect are present on the type specimen, but they are not determinable. The walls of the pockets consist of thin-walled hyphæ 1–1·5 μ diameter, not the usual thick-walled hyphæ of *Hypocrella*. In spores, ascus, and habit, however, the fungus is certainly *Hypocrella*.

Distribution.—Singapore, coll. J. Bancroft and coll. H. N. Ridley, in Herb. Kew. Luzon, Merrill 7149 in Herb. Peradeniya.

Figures.—Plate 3, fig. 26, specimen *ex* type, × 2 ; Plate 2, fig. 21, lower surface, × 5 ; Plate 4, fig. 8, section, × 3.

Hypocrella convexa Rac., Bull. Akad. Sci. Cracovie (1906), p. 908.—Stromata oval in plan, up to 5 mm. diameter, convex, up to 2 mm. thick in the centre, smooth or feebly rugose, margin obtuse or acute, pale ochraceous or yellowish-white, internally white, compact, but rather soft ; ostiola red-brown, usually sunk, sometimes slightly elevated, scattered, more numerous towards the margin, sometimes absent in the centre. Perithecia flask-shaped, with a long neck, 0·5 mm. deep, 0·15–0·2 mm. diameter. Asci 210 × 8 μ ; part-spores cylindric, or slightly barrel-shaped, ends truncate, 6–10 × 1·5–2 μ.

Type specimen, *ex* Herb. Raciborski, on a scale insect on *Myristica*, Depok, examined. Raciborski (*loc. cit.*) also records it on a scale insect on *Garcinia*, Buitenzorg. The scale insect on the specimen examined is *Lecanium* (*? expansum*). The type specimen bears much resemblance to *Hypocrella scutata*, but has larger part-spores, and is not resinous ; the latter point, however, may depend on the scale insect. Another gathering, *ex* Herb. Raciborski, on *Calycodaphne* sp., Java, is apparently the same, but the stromata vary in shape ; they are up to 6 mm. in diameter, circular, smooth, convex, thinning out gradually to the margin, or thinning abruptly with a broad thin margin ; the perithecial orifices are irregularly scattered, crowded towards the margin, less numerous in the centre, with red-brown, usually sunk ostiola ; the part-spores are more mature than in the type, slightly barrel-shaped, 6–10 × 1·5–2 μ ; this collection is parasitic on *Lecanium* (*? expansum*).

A specimen in Herb. Kew, on *Lecanium expansum* on *Chisochiton* sp., Perak, coll. H. N. Ridley, may be the *Aschersonia* stage of this species. The stromata are up to 7 mm. diameter, convex in the centre, and up to 2 mm. thick, thinning out regularly to the margin, or thinning abruptly into a broad thin margin, which is usually recurved. The pycnidial orifices are situated in minute elevations, numerous towards the margin, few or none in the centre. The pycnidia are regularly flask-shaped or pyriform, 0·3–0·4 mm. deep, regularly arranged near the periphery ; the pycnospores are fusoid, ends pointed, 8–10 × 1·5–2 μ.

Distribution.—Java, in Herb. Raciborski.

Figures.—Plate 3, fig. 27, specimen *ex* type, × 5 ; Plate 4, fig. 22, section, × 6.

Hypocrella bispora v. Höhnel, Sitzungsber. d. Kais. Akad. d. Wissensch., Wien, CXVIII., p. 826 (1908).—Stromata brownish-black to black, scutate, 3–5 mm. diameter, umbonate in the centre, 1·5 mm. thick, 1 mm. thick at the margin, which is somewhat swollen and rounded, smooth, with a white membrane underlying the stroma ; ostiola scattered, scarcely projecting. Internally white or slightly fuscous, with a purplish or blackish peripheral zone about 0·1 mm. deep. Perithecia rather scattered, ovate to flask-shaped, 220–280 μ high, 110–120 μ diameter, usually with a long neck up to 120 μ long ; perithecia 160 × 95 μ, if the neck is absent. Asci 80–100 × 4·5 μ, two- or four-spored. Part-spores cylindric, 4–6 × 1·5 μ.

Specimens and slides of this species were kindly lent me by Prof. von Höhnel. It was collected on leaves of *Pinanga*, at Salak, near Buitenzorg. In shape it resembles flat specimens of

H. olivacea, but differs in colour and in the smooth stroma. The white basal membrane underlies the stroma, and does not appear to be attached to it, in the specimen examined, except in the centre ; it would seem doubtful whether it is really a part of the *Hypocrella*. Compared with *H. palmicola* the stroma is more compact, the ostiola less prominent, and the perithecia less crowded. It does not give any colour with potash.

Distribution.—Java, in Herb. von Höhnel.

Figures.—Plate 2, fig. 8, specimen *ex* type, × 8 ; Plate 4, fig. 20, section, × 6.

Hypocrella verruculosa Möller, Phycomyceten and Ascomyceten (1901), p. 299.—Yellow-brown, hemispherical, closely tuberculate, a few millimetres diameter. Conidia not seen. Perithecia scattered, completely immersed, elongated flask-shaped, 600 μ deep, including the long neck ; ascus 270–300 μ long, four-spored ; part-spores 12–15 × 3·5 μ, oval.

The above description is from Möller, *loc. cit.* I have unfortunately not seen the type specimen, which is not included in the dried specimens in Herb. Berlin ; I have since been informed that it is preserved there in alcohol. Möller's figure shows that the species is two-thirds globose, coarsely tuberculate, the tubercles being close set and broadest at the outer end, so that in section the stroma appears furrowed. A slide kindly lent me by Prof. Möller shows that the stroma has a yellow-brown cortex, about 0·15 mm. thick, irregularly incised and undulating ; the perithecia are deep-set, and the ostiola sometimes project ; the part-spores are narrow-oval, truncate, or almost pointed, 10-16 × 3–4 μ ; some, if not most, of the asci are eight-spored ; some appear four-spored, but it is difficult to determine that with certainty as the sections are unstained ; some of the immature asci do not exceed 170 μ in length, and the sections show immature part-spores measuring only 6 × 1·5 μ.

Theissen's "*Hypocrella verruculosa*," Rick, Fungi Austro-Americani, No. 294, included under that name in Herb. Berlin, contains tuberculate specimens of *Hypocrella phyllogena* only. But Möller's figures and slides do not show any of the characters of the latter species. Ule 872, St. Cathar, pr. Blumenau is included under *Hypocrella verruculosa* in Herb. Berlin, with a note by Hennings that it is "ohne perithecien," but a letter from Möller, included with the specimens, disagrees with the identification ; the specimens are *Munkia martyris* Speg. Thus. the type specimen is the only gathering of this species known up to the present ; it may, perhaps, be identical with *Hypocrella epiphylla*.

Distribution.—Brazil, Blumenau, on stems of bamboo and *Olyra*.

Figures.—Plate 4, fig. 15, section, after Möller, × 2.

Hypocrella javanica (Penz. & Sacc.) Petch, Ann. Perad., IV., p. 231 (1910).—Stromata hemispherical or two-thirds globose, up to 5 mm. diameter ; when small even, or with scattered, projecting ostiola, when large tuberculate, with close-set rounded tubercles up to 0·8 mm. diameter ; minutely pruinose at first, becoming glabrous ; often surrounded, in the case of small specimens, by a narrow byssoid hypothallus ; rather soft in the *Aschersonia* stage, becoming hard ; orange or red-brown, internally yellow with a reddish peripheral zone. Pycnidial orifices circular, scattered, sunk, up to 0·2 mm. diameter ; pycnidia oval or sub-pyriform, up to 0·5 mm. deep, 0·2–0·3 mm. diameter ; pycnospores narrow-oval, ends pointed, 9–14 × 2–3·5 μ ; basidia up to 20 μ high, usually simple, 1–2 μ diameter, tapering upwards ; pycnospores extruded in isolated yellowish masses. Perithecia several in each tubercle, ostiola red-brown, slightly projecting ; perithecia flask-shaped, up to 0·5 mm. deep, 0·35–0·4 mm. diameter ; asci up to 180 × 7–12 μ ; part-spores oblong-oval, ends rounded, 8–10 × 2·5–3 μ. *Fleischeria javanica* Penz. & Sacc., Malpighia (1901), p. 230 ; *Hypocrella vel Aschersonia Randiæ* Koord., in Herb. Berlin. *Aschersonia* stage—*Aschersonia Coffeæ* P. Henn., Hedwigia (1902), p. 145 ; *Aschersonia pediculoides* P. Henn., Hedwigia (1902), p. 145 ; *Aschersonia Eugeniæ* Koord., Bot. Untersuch. (1907), p. 214 ; *Aschersonia Suzukii* Miyabe and Sawada, Jour. Coll. Agric., Tohuku Imp. Univ., V., p. 80.

In my preliminary note, *Hypocrella javanica* and *Aschersonia Coffeæ* were kept distinct. Except for the absence of a hypothallus, the smaller pycnidial stromata of *H. javanica* are indistinguishable from *A. Coffeæ*. The hypothallus is, however, a variable feature in *A. Coffeæ*, reduced in some cases to a very narrow swollen ring, and this latter form can be matched in recent gatherings of *Hypocrella javanica* in Ceylon. The stout basidia and large spores distinguish the *Aschersonia* stage from other Aschersonias of the same shape. Potash colours a section purple, especially round the margin.

The type of *Fleischeria javanica* was collected in Java, on living branches of an undetermined tree, Tjibodas. I have not seen the type, but what is undoubtedly the same species is common in the jungle at Hakgala, Ceylon, at an elevation of 5,600 feet, usually on *Lecanium oleæ* on leaves and stems of *Allophylus zeylanicus* L. The *Aschersonia* stromata are usually minute, 1–2

mm. diameter, and even ; the *Hypocrella* stromata are up to 5 mm. diameter, tuberculate, and glabrous. In Herb. Berlin, a specimen collected in Java by Koorders is marked *Hypocrella v. Aschersonia Randiæ* Koord. A specimen from Brisbane, included under *H. discoidea* at Kew, is most probably this species ; it is marked "In the House of Acclimatization on a Japan Orchid," the specimens are hemispherical, tuberculate to almost smooth, minutely tomentose, brownish-red with a narrow white fibrillose margin ; internally it shows a broad purplish peripheral zone in section ; it appears to be sterile, but Berkeley has noted that the spores are 10–12·5 μ long.

Hypocrella javanica (*Aschersonia* stage) was collected by Thwaites at Nuwara Eliya (Thwaites 255) and forwarded to Berkeley and Broome, who referred to it, in Fungi of Ceylon, *sub* No. 1027, as "the stylosporous form of some *Nectria*." The type of *Aschersonia Coffeæ* in Herb. Berlin, on *Coffea Liberica*, Java, contains small specimens, rather flattened, up to 1 mm. diameter, including a narrow hypothallus up to 0·1 mm. wide ; the hypothallus is slightly ochraceous or orange ; Hennings gives the length of the basidia as 20–40 μ, but they do not appear to exceed 20 μ. *Aschersonia pediculoides* P. Henn., type in Herb. Berlin, on *Jambosia vulgaris*, Java, now contains minute, flattened, almost discoid specimens, up to 0·6 mm. diameter, with a broad fibrillose hypothallus, up to 0·8 mm. wide, giving a total diameter of about 2 mm., as stated by Hennings. Both in *A. Coffeæ* (type) and *A. pediculoides* the small specimens may have only a single central pycnidium. *Aschersonia Eugeniæ* Koord., type in Herb. Berlin, on *Eugenia cymosa* and *Eugenia polyantha* Java, contains specimens up to 1·5 mm. diameter, hemispherical, flattened above or almost discoid, orange, paler below, becoming red-brown above, with a rather stout hypothallus up to 0·5 mm. wide ; the first of these gatherings is on the scale, *Vinsonia stellifera* Westw., the second on *Lecanium* sp.

Parkin's *Aschersonia* No. 4, p. 39, on *Lecanium* (*? coffeæ*) on leaves and stems of Tea, Darjeeling, is this species ; the stromata are up to 4 mm. diameter and 2·5 mm. high ; none of them has a conspicuous hypothallus, but some have a narrow swollen ring round the base ; some of these are much larger than any other non-tuberculate examples. Parkin's Aschersonia B. 2, on *Lecanium hemisphæricum* var. *coffeæ* on Tea, Upper Assam, and B. 3, on *Lecanium* on Tea stem, Kurseong, India, are also *A. Coffeæ*. In Herb. Peradeniya are specimens on *Eriochiton theæ* Green, on Tea, Assam, and on *Lecanium hemisphæricum* on *Schizœa digitata*, Ceylon. In Herb. Pusa this species is represented by a gathering on *Lecanium* sp. on Tea, Jorhat district, Assam, coll. A. C. Tunstall.

A specimen in Herb. Kew, marked *Aschersonia Ayresii* Berk., may possibly be this species. It was collected in Mauritius and bears the inscription "*Sclerotium orchidacearum* Ayres. On an *Angræcum*, Port Louis, 1862." The stromata are clustered, two-thirds globose, or distorted by mutual pressure, dusky red-brown,

minutely tomentose, smooth, hard, internally reddish, yielding a yellow extract with potash. They appear to be quite sterile, and their reference to this species is doubtful.

Hypocrea armeniaca B. & C. (Amer. Acad. Art & Sci., Boston, IV. (1858), p. 128), on living leaves of *Apocyneæ*, Bonin Islands, type in Herb. Kew, is an *Aschersonia* on *Lecanium* sp. The specimens are minute, about 0·5 mm. diameter. They resemble small specimens of *Aschersonia Coffeæ*, but are apparently sterile. *Hypocrea armeniaca* B. & C., Grevillea, IV., p. 15, is a totally different species.

Aschersonia Suzukii Miyabe and Sawada, from Formosa, is *Aschersonia Coffeæ*, according to the type collection in Herb. Sapporo. The specimens are small, not exceeding 2·5 mm. diameter, but have the typical conidia and conidiophores. There is another collection in Herb. Sapporo, *sub Aschersonia Aleyrodis*, said to be on *Aspidiotus aurantii* on *Citrus nobilis*.

Distribution.—Java, in Herb. Berlin (*Hypocrella v. Aschersonia Randiæ, A. Coffeæ, A. pediculoides, A. Eugeniæ*). Ceylon, in Herb. Peradeniya. India, in Herb. Pusa and Herb. Peradeniya. ? Queensland, in Herb. Kew (*sub H. discoidea*). Formosa, in Herb. Sapporo.

Figures.—Plate 2, fig. 6, smooth *Aschersonia* stage, *ex* type of *Aschersonia Eugeniæ*, × 6; Plate 2, fig. 11, *Hypocrella* stage, Ceylon specimen, × 6; Plate 4, fig. 23, *Hypocrella*, × 3; Plate 5, fig. 63, pycnospores, × 1000.

Hypocrella Gartneriana Möller, Phycomyceten und Ascomyceten (1901), p. 299.—Stroma globose, light yellow, fleshy, several centimetres diameter, covered with large, close-set, pulvinate or clavate processes. Perithecia situated at the outer ends of the processes, scattered, half or wholly immersed, globose, about 350 μ diameter, with a short neck. Ascus 180 μ long, four-spored. Part-spores 4–6 × 1·5 μ, rod-like, not separating within the ascus.

The above description is from Möller, *loc. cit.* The type specimen, which I have not seen, is said to be in the spirit collection in Herb. Berlin. Apparently only one example was found. Möller's figure shows that it was about 3 cms. in diameter, exceeding anything else yet recorded in this genus. From the figure showing the cross section, the processes occupy more than half the total thickness of the stroma, and are inflated outwards, so that deep sinuses appear between them in section. In a slide lent me by Prof. Möller, the perithecia are oval, 350–400 μ deep, with projecting ostiola, the wall of the perithecium being deep yellow-brown. The asci were immature, but some appeared to have more than four spores; unfortunately the slide would not admit of a high magnification. Möller's description of the part-spores,

"not separating in the ascus" indicates immaturity. The species differs from *H. verruculosa* chiefly in the short neck of the perithecium; otherwise it might be considered a large form of the latter.

Distribution.—Brazil, on Bamboo.

Figures.—Plate 4, fig. 16, section, after Möller, × ⅔.

Hypocrella Schizostachyi P. Henn., Philippine Journal of Science, III., p. 45 (June, 1908).—Stromata two-thirds globose, strongly botryoso-tuberculate, 1·5–2 cms. diameter, very hard, verrucose; internally yellowish with an orange-red zone at the periphery; perithecia flask-shaped, 0·3 mm. deep, 0·15 mm. diameter, body comparatively small, neck long, ostiola slightly projecting. Asci 100–160 × 6–8 μ, eight-spored. Part-spores cylindric to narrow-oval, 5–8 × 1·5–2 μ.

The type specimen, on *Schizostachyum* sp., from Luzon, is in Herb. Berlin, and the co-type has been kindly furnished me by Prof. E. D. Merrill. Hennings states that the colour is "cinereo-testaceus," but the specimens now are reddish-purple.

From Prof. von Höhnel I have received specimens, under the MSS. name of *Fleischeria purpurea*, from Borneo. These are pulvinate or subconoid, 6 mm. diameter at the base and 5 mm. high. The surface is irregularly furrowed, but appears damaged, as though projecting tubercles had been cut off; one specimen is strongly tuberculate towards the margin, as in *Hypocrella Schizostachyi*. The colour is blackish-purple, internally reddish-purple, but the specimens had been preserved in alcohol, and the internal colour is evidently to be attributed to the diffusion of colour from the exterior layer, since the masses of asci in the perithecia are stained, and, in section, appear a deeper colour than the stroma. The stromata are very hard, and their perithecia and spores agree exactly with those of *H. Schizostachyi*. In my preliminary paper this was included under *H. ceramichroa*, but it would appear to agree better with *H. Schizostachyi*.

Distribution.—Philippines, in Herb. Berlin and Herb. Peradeniya. Borneo, in Herb. Peradeniya.

Figures.—Plate 2, fig. 7, specimen *ex* co-type, × 2; Plate 4, fig. 17, section, nat. size.

Hypocrella Amomi Rac., Bull. Akad. Sci. Cracovie (1906), p. 908.—Stromata circular, up to 4 mm. diameter, pulvinate, up to 1 mm. high, bearing up to twelve erect tubercles, each containing one perithecium; tubercles clavate, flattened at the apex, up to 0·3 mm. high, 0·3–0·4 mm. diameter at the apex, the whole surrounded by a very thin hypothallus, which

may be 2 mm. broad ; yellowish-white, somewhat translucent ; ostiola not projecting, translucent. Perithecia flask-shaped with a long neck, 0·5 mm. deep, 0·2 mm. diameter, wall yellow. Asci up to 400 μ long, 8–10 μ diameter ; part-spores fusoid, ends tapering and pointed, 13–16 × 1·5–2 μ. Pycnidial stroma discoid, top concave, bordered by a white thin hypothallus ; pycnidium central, ostiolum tubular, labyrinthiform below ; pycnospores fusoid, ends tapering, 8–10 × 1·5–2 μ ; no paraphyses.

Type specimen, on a scale insert on *Amomum*, Gunung Gakak, Java, *ex* Herb. Raciborski, examined. The insect was not evident, but there was a single pycnidial stroma present, which indicated, by the absence of paraphyses, that it was parasitic on a species of *Lecanium*. The type of pycnidial stroma is that of *A. cubensis*, but not so elevated. This species bears a considerable resemblance to *Hypocrella botryosa*, but its ascospores (part-spores) are longer. The type collection is not matched by any other gathering seen.

Distribution.—Java, in Herb. Raciborski.

Figures.—Plate 2, fig. 5, specimen *ex* type, × 8 ; Plate 4, fig. 21, section, × 6 ; Plate 5, fig. 60, part-spores, × 900.

Hypocrella botryosa Syd., Annales Mycologici, VIII., p. 39 (1910).—Stromata irregularly oval or circular in plan, 2–3 mm. diameter, consisting of a central, pulvinate or convex, solid mass, sometimes constricted at the base, from which arise numerous (up to 12) erect or horizontal processes, the whole bordered by a thin, hyaline, horny hypothallus. Processes clavate or ovate, strongly inflated outwards, up to 1 mm. diameter at the distal end, each containing several perithecia. Minutely pruinose, pale ochraceous, somewhat translucent. Ostiola yellow to red-brown, not projecting ; wall of the perithecium pale yellow or almost hyaline. Perithecia flask-shaped, 0·3 mm. diameter, 0·5 mm. deep ; asci 130–225 × 8–14 μ ; part-spores narrow-oval, ends acute, sometimes almost lozenge shaped, 8–11 × 2·5 μ.

The type specimen in Herb. Sydow is from the Philippines, "on leaves of *? Cyperaceæ*." It resembles *Hypocrella Amomi*, but its processes are strongly inflated at the distal end, sometimes almost globose at the extremity, and each contains several perithecia. The stroma is sometimes constricted at the base, and in that case approaches the stud-shaped stroma of *Hypocrella phyllogena*.

Distribution.—Philippines, in Herb. Sydow.

Figures.—Plate 3, fig. 54, specimen *ex* type, × 8; Plate 4, fig. 18, section, × 4.

Hypocrella nectrioides Thaxter *in litt.*—Stroma up to 2 mm. diameter; basal part plano-convex, up to 0·3 mm. thick, bearing numerous clustered, ovoid or turbinate processes, 0·6–0·8 mm. high, 0·5–0·7 mm. diameter, minutely tomentose, the apices of the processes becoming glabrous; rosy orange when fresh (Thaxter), white, slightly translucent, in herbarium specimens. Perithecia single in each process, narrow flask-shaped, up to 0·5 mm. deep, 0·2 mm. diameter, opening rather widely when mature. Asci (part-spores mature) 300 × 14 μ. Part-spores narrow-oval, ends obtuse, 8–12 × 2·5–3 μ.

On a scale insect on *Pentaclethra* sp., St. Ann's Valley, Port of Spain, Trinidad (coll. R. Thaxter).

In the available specimens the stromata have developed on a scale insect on the rachis of the *Pentaclethra* leaf, and have in consequence encircled the rachis, so that the processes project in all directions. If developed on a flat surface it would no doubt closely resemble *Hypocrella Amomi*, from which it differs chiefly in the shape of the spores and the absence of a scarious hypothallus. On the other hand, it resembles some forms of *Hypocrella Raciborskii*, and it might prove, when the *Aschersonia* stage is known, to belong to the *Aleyrodiicolæ*.

Hypocrella turbinata (Berk.) Petch, Ann. Perad., V., p. 535 (1914).—Stromata simple, subcylindric, about 1·5 mm. diameter and 1 mm. high, expanded at the base into a stout horizontal margin up to 0·25 mm. broad, upper surface truncate, sometimes plane, more usually concave, minutely umbilicate in the centre; or egg-cup shaped; or compound with a solid hemispherical or convex basal stroma up to 4 mm. diameter, from which arise several (up to 12) cylindric or obconic processes with a concave upper surface; white, becoming black when old, minutely tomentose; moderately hard. Pycnidial orifices on the concave disc, sometimes solitary and central; pycnidia irregular, branching internally; pycnospores narrow-oval, ends pointed, with apparently solid, conical tips about 2 μ long, 10–13 × 3·5–4 μ. Perithecia flask-shaped, 440 μ long, 150 μ diameter; asci 210 ×

7–8 μ ; part-spores cylindric, ends rounded, 10–12 × 2–2·5 μ (Thaxter). *Aschersonia* stage.—*Aschersonia turbinata* Berk., Ann. Nat. Hist., Ser. 2., IX., p. 192 (1852) ; *Aschersonia Pittieri* P. Henn., Hedwigia (1902), p. 104.

This is apparently a common species in the West Indies. All specimens hitherto collected have been recorded as *Aschersonia*, but Thaxter has recently shown that the perithecia occur in the basal stroma (Bot. Gaz., LVII., p. 358), not, like the pycnidia, on the concave disc. Large specimens of this species are unmistakable. They consist of a large, pulvinate basal stroma, often cracked and reticulated when old, from which arise, in all directions, what appear to be stout-stalked Pezizas, the stalk being usually obconical, and the upper end expanded into a concave disc. Smaller specimens may bear only one disc ; if the basal stroma is developed, they are then constricted in the middle or somewhat egg-cup-shaped. But specimens which have a single disc are often merely columnar, and they may then be confused with *Aschersonia cubensis ;* they differ from the latter species in the shape of the pycnospores and in the sharp edge of the disc. The surface of the disc is not sporiferous in the specimens examined ; the pycnidia are embedded in the stroma below the disc and open on to it. The colour given above is that of the herbarium specimens ; but a communication from Mr. F. W. South states that the stromata are white when young, and pale pink when older, surmounted by a central, red mass of spores. In a collection of small specimens from Trinidad, *ex* Herb. Thaxter, they are yellow.

Berkeley's type specimen, from Nicaragua, in Herb. Kew, contains the largest specimens I have seen ; they are up to 1 cm. in diameter, with four or five stalked discs, the discs being up to 4 mm. across. Herb. Paris contains a co-type from Berkeley, and also specimens " C. Wright, Nicaragua, Herb. of the U. S. North Pacific Exploring Expedition, 1853–6." There are also specimens in Herb. Kew, det. Hennings, on *Lucuma caimito* from Brazil, *ex Herbario Amazonico Musei Parænsis.* Herb. Berlin contains specimens from Brazil, on *Chrysophyllum caimito*, coll. Huber, and others on leaves of *Miconia triandra*, coll. Pere Duss, 1901, apparently from Guadeloupe. The type of *Aschersonia Pittieri* in Herb. Berlin, from Cocos Island, Wasser Bay (Costa Rica), on leaves of *Citrus aurantium*, contains poorly developed specimens of *Aschersonia turbinata* on *Lecanium hesperidum* Auctt.

The specimens assigned to *Aschersonia oxyspora* Berk., in Jour. Linn. Soc., XV., p. 394, are small specimens of *A. turbinata ;* the name was entered in error under *A. cubensis* in my preliminary paper. This collection has a somewhat involved history, of which the following appear to be the facts. In Hooker's Journal of Botany and Kew Garden Miscellany, VI. (1854), p. 205, Berkeley described *Aschersonia oxystoma* from India. In the same Journal, VIII. (1856), p. 278, he listed a specimen from S. Carlos, Brazil,

collected by Spruce, and compared it with the Indian species, stating that its spores differed in length, but the difference was not enough to constitute a distinct species ; he had changed the name to *A. oxyspora.* In Jour. Linn. Soc., X. (1869), Berkeley gave a list of Cuban fungi, and on page 351 of his paper he described *Aschersonia cubensis* B. & C., adding " River Amazon." This addition indicates an extra-Cuban locality for the same species, and as Berkeley stated in his introduction that he had a complete set of Spruce's specimens from the Amazon available for comparison, it is probable that the Amazon record refers to the same specimen as that previously recorded under the name of *A. oxyspora.* In Jour. Linn. Soc., XV., however, Berkeley and Cooke compiled a full account of the fungi of Brazil then known, and there they listed " No. 373. *A. cubensis* B. & C. Cuban Fungi, No. 557, Brazil (M. J. B.)," and "No. 374. *A. oxyspora* Berk ; in Hook. Jour. (1856), p. 278. On dead leaves, S. Carlos, Spruce." It would appear that, as far as Brazil is concerned, these records refer to the same gathering, *i.e.*, that by Spruce, on dead leaves, S. Carlos ; this specimen is in Herb. Kew., *sub Hypocrella oxyspora,* and consists, as stated, of small specimens of *A. turbinata.*

In Bull. No. 13, U. S. Dept. of Agriculture, Division of Vegetable Physiology and Pathology, H. F. Webber has recorded *Aschersonia turbinata* from Florida on *Ceroplastes floridensis* on Orange, Mandarin orange, and Hackberry (*Celtis occidentalis*). Webber describes the stromata as white, and states that the conidia when extruded are orange rufous to cinnamon in mass. His figures leave no doubt as to the accuracy of the identification. There are specimens on *Ceroplastes* on *Citrus* from Florida, collected by E. W. Berger, in Herb. British Museum.

Mr. F. W. South has furnished me with specimens from St. Lucia on Java plum, from Dominica on mango, and from Trinidad on *Lecanium* (*? mangiferæ*) on Guava. Some of these specimens are sub-hemispherical, *i.e.*, their sides are convex, not vertical ; most of them are truncate and concave above, but one bears two concave surfaces (not stalked), placed obliquely and meeting in a ridge at the apex. The fungus has been recorded from the West Indies as *Hypocrella oxyspora* Mass. Specimens have been sent me from Trinidad and Grenada by Professor Thaxter.

In perithecial specimens from Professor Thaxter, the stromata are hemispherical or subglobose, tuberculate, minutely tomentose. The pycnidial disc is usually situated on one side, sometimes towards the base, and embedded in the stroma, and presents the appearance of having been displaced from its usual apical position by the continued growth of the basal part of the pycnidial stroma.

Distribution.—Nicaragua, in Herb. Kew, Herb. Paris, and Herb. Berlin. Costa Rica (*Aschersonia Pittieri*) in Herb. Berlin. Guadeloupe, in Herb. Berlin. Brazil, in Herb. Kew and Herb. Berlin. Trinidad, St. Lucia, Grenada, and Dominica, in Herb. Peradeniya. Florida, in Herb. British Museum.

Figures.—Plate 2, fig. 19, *Aschersonia*, simple form, West Indies, × 6 ; Plate 2, fig. 22, *Aschersonia*, old compound specimen, West Indies, × 4 ; Plate 3, fig. 49, *Aschersonia*, West Indies, × 6 ; Plate 3, fig. 50, *Hypocrella*, Grenada, × 6 ; Plate 4, fig. 33, *Aschersonia*, small form, section, × 6 ; Plate 4, fig. 34, *Aschersonia* section, × 6 ; Plate 4, fig. 35, *Hypocrella*, section (after Thaxter) ; Plate 5, fig. 64, pycnospores, × 1000.

Hypocrella phyllogena (Mont.) Petch, non Speg.—Stud-shaped, total height up to 2 mm., consisting of a hemispherical or broadly convex head, 2–3 mm. diameter, narrowed below into a thick stem, which expands at the base into a broad hypothallus ; head smooth, or verrucose, or tuberculate, margin regular or incised. Or pulvinate, conical or conico-convex, up to 3 mm. diameter and 1·5 mm. high, bordered by a broad hypothallus. White, yellowish-white, or ochraceous (colour of dried specimens). Hypothallus thin, membranous and hyaline, or byssoid, or stout and tomentose, from 1·5 to 4 mm. wide. Perithecia scattered, only on the head in the stud-shaped forms ; ostiola slightly projecting, yellow-brown or red-brown ; perithecia flask-shaped, 0·3–0·6 mm. long, 0·15–0·25 mm. diameter ; asci 180–225 × 12–14 μ, eight-spored, spores usually wound in a flat spiral ; part-spores cylindric, straight or slightly curved, usually inflated in the middle, 8–14 × 1·5 μ, or 14–20 × 1·5–2 μ. Pycnidia flask-shaped, ostiola yellow-brown, situated on the stalk in the stud-shaped forms, scattered in the pulvinate forms ; in the latter sometimes irregular and widely open ; pycnospores usually narrow-oval or lozenge-shaped with long pointed ends, 10–16 × 1·5–2·5 μ, points up to 3–4 μ long, sometimes fusoid, ends pointed, but not produced. *Hypocrea phyllogena* Mont., Ann. Sci. Nat., Ser. II., XIII., p. 340 (1840) ; *? Hypocrella citrina* Speg., Fungi Puigg., No. 303 (1889), *fide* Theissen ; *Hypocrella abnormis* P. Henn., Fungi Goyazenses, Hedwigia, XXXIV., p. 106 (1895) ; *Hypocrella ochracea* Massee, Jour. of Bot. (1896), p. 150, t. 357, fig. 10–13 (in part) ; *Moelleriella sulphurea* Bres., Hedwigia (1896), p. 298 ; *Hypocrella Edwalliana* P. Henn., Hedwigia (1897), p. 223 ; *Hypocrella ochracea* Mass., Möller, Phycomyceten und Ascomyceten, 1901 ; *Hypocrella Weberbaueri* P. Henn., Engler's Bot. Jahrb., XL., p. 226 (1907) ; *Hypocrella coronata* v. Höhnel, Denkschr.

Math-naturw. Kl. Akad. Wiss. Wien., LXXIII., p. 22 (1907); *Hypocrella verruculosa* Theiss. non Möller, Ann. Myc., IX. (1911), p. 67. *Aschersonia* stage,—*Aschersonia basicystis* B. & C., Cuban Fungi, No. 558, Jour. Linn. Soc., X. (1869), p. 352; *Hypocrea amazonica* Cooke (in part), Grevillea, XVI., p. 25 (1897); *Aschersonia juruensis* P. Henn., Fungi Amazonici, III., Hedwigia (1904), p. 388; *Aschersonia Puttemansii* P. Henn., in Herb. Berlin; *Aschersonia Chloniæ* Speg., in Herb. Speg.; "*Aschersonia oxyspora* Berk.," in Herb. Speg.; *Aschersonia Jacarandæ* Speg., Mycetes Argent., Ser. V., An. Mus. Nac. Buenos Aires, XX., p. 456 (1910).

The colours given above are those of the herbarium specimens. According to Montagne's description (Ann. Sci. Nat. Ser. II., Vol. XIII., p. 340), this species is orange, with purple perithecial orifices, the perithecia being embedded in a purple zone; the part-spores were said to be curved, and inflated in the middle. His figures show two very minute purplish-red examples, dotted with dark ostiola: in section, the stroma is yellowish below and pinkish above. Montagne stated that it became pale ochraceous when dried. The figures show that the specimens examined by him were stud-shaped, and had part-spores inflated in the middle; neither of these, however, proves to be constant. The type specimen is Leprieur No. 580, on leaves of *Coutarea speciosa*, Cayenne, March, 1839; there is now only one specimen of the fungus in this gathering in Herb. Montagne; it is 2·2 mm. diameter, yellowish-white, constricted below, with scattered perithecial ostiola on the head; it fits Montagne's figure exactly. Another collection in Herb. Montagne is labelled "Leprieur 1121. Jour. second Guyana"; it contains eight specimens, which still show traces of purple, though the general colour is ochraceous; some of these are not stud-shaped, but merely pulvinate or conical; the central portion is up to 2·8 mm. diameter and 1·2 mm. high, bordered by a hypothallus about 1 mm. wide. Another gathering, Leprieur No. 1122, containing four specimens, is in the general collection, Herb. Paris. *Hypocrella citrina* Speg. is said by Theissen (Ann. Myc., IX., p. 66) to be identical with *H. ochracea*, which is *H. phyllogena*; I have not seen the type specimen: the description would fit the latter species. The type specimen of *H. abnormis* P. Henn., in Herb. Berlin, is labelled "Herbarium Ign. Urban. 18,784. Brasilia 1890/91 leg. A. Glaziou"; it contains two leaves, one of which bears a single yellowish-white specimen of *H. phyllogena*, while the other bears five specimens, all but one being much decayed and greenish (through mould ?). *Hypocrella Edwalliana* P. Henn., type in Herb. Berlin, "in foliis Lauraceæ, Brasil," contains stud-shaped as well as pulvinate forms; the former have either smooth or tuberculate heads, and bear perithecia on the head and pycnidia

on the stalk, the pycnospores measuring 14–16 × 1·5–2·5 μ ; in the pulvinate forms the pycnidia are irregular, and in one example the centre of the stroma is convoluted, with deep sinuses, resembling an Aleyrodid *Aschersonia ;* the description and measurement of the spores given by Hennings is that of the pycnospores. The type of *Hypocrella ochracea* Massee, in Herb. Kew, contains Glaziou 18,806, 18,811, and 18,812, and unnumbered duplicates ; 18,811 and 18,812 are apparently on the same plant, while 18,806 and the duplicates are on two other different plants ; on the leaf 18,806 there are two species, the *Aschersonia* stage of *H. phyllogena* and *Aschersonia turbinata ;* specimen 18,812 is an Aleyrodi *Aschersonia, Aschersonia Goldiana* Sacc. & Ellis ; the duplicates contain *Hypocrella phyllogena,* with ascospores up to 20 × 3 μ and pycnospores with shorter tips than usual, and purple-red sterile specimens which are apparently the same ; a packet marked ascigerous by Massee contains one specimen, evidently the same as those in 18,811 and the duplicates. In Herb. Paris Glaziou 18,811 is included under *Hypocrella phyllogena,* while in Herb. Berlin it is placed under *H. Edwalliana ;* the species is the same throughout. In the type of *H. Weberbauri* P. Henn., Weberbaur No. 3,601 in Herb. Berlin, the specimens are stud-shaped and up to 3 mm. diameter ; the head is hemispherical, smooth, slightly grooved round the margin, brownish or ochraceous ; the stalk is short, and the hypothallus either scarcely exceeds the diameter of the head or extends 2 mm. beyond it ; the groove between the hypothallus and the head is very narrow and deep ; the part-spores measure 14–20 × 1·5–2 μ, and are either curved or straight, and sometimes inflated in the middle ; some of the specimens are greenish ; a note by the collector (?) states that the "thallus" is orange coloured. *Hypocrella coronata* v. Höhnel agrees with *H. phyllogena,* except in one respect ; a specimen supplied by von Höhnel has a diameter of 4·5 mm. without the hypothallus, and 8 mm. including the hypothallus ; it is pale yellow, discoid, 1·5 mm. high, depressed in the centre, with a slight groove at the base ; the upper surface is verrucose, and bears numerous tapering, conical appendages, often curved, up to 1 mm. long, usually arising from near the ostiola ; the spores are wound in a flat spiral, and the part-spores are cylindric, slightly ovoid, 9–12 × 2–2·5 μ ; it differs from *H. phyllogena* only in possessing these appendages, but the same form occurs in the type specimen of *H. sulphurea* in Herb. Berlin (Möller, 28*b*). Under *Moelleriella* (*Hypocrella*) *sulphurea* Bres., in Herb. Berlin, are two collections, one, the type, Möller 28*b*, St. Cathar. Blumenau, and the other from E. Ule ; both are *H. phyllogena. Hypocrea amazonica* Cke, type in Herb. Kew, Spruce No. 528, contains *Aschersonia basicystis, A. disciformis,* and an unnamed purple-brown *Aschersonia.* Specimens collected by Rick, Fungi Austro-Americani No. 294, Sao Leopoldo 1907, were assigned to *Hypocrella verruculosa* by Theissen, and are included under that name in Herb. Berlin, while others of the same collection have been lent me by Theissen ; this collection contains two forms, the one normal *H. phyllogena,* with the head smooth or

verrucose, and the other probably a parasitized form of the same species. The latter is gray or brownish-gray, lenticular or broadly conico-convex, circular in plan; pycnidia scattered; the stromata appear at first sight to be attached to the leaf over the whole of the base, but a vertical section shows that they are attached by a central disc, separated from the main mass, except in the centre, by a deep narrow cavity; the structure is therefore that of *phyllogena*, but the stalk is much reduced; the basal cavity is lined with basidia which bear minute, oblong-oval pycnospores, 4–6 × 0·75–1·5 μ.; these pycnospores are similar to those found in parasitized specimens of *Aschersonia placenta*. *Aschersonia basicystis* Berk., the pycnidial stage of *Hypocrella phyllogena*, was described from Wright's Cuban Fungi No. 766; after the description Berkeley added "No. 787 has the same species on leaves from swamps mixed with a tufted *Scytonema*"; the type (No. 766), in Herb. Kew, contains two specimens only; these are stud-shaped, with pycnidia on the stalk, the pycnospores being oval or lozenge-shaped with long thin ends, and measuring 10–12 × 2–3 μ.; No. 787 is included under *Aschersonia basicystis* in Herb. Kew, Herb. Paris, and Herb. Berlin (in the latter case, *ex* Herb. G. Winter), but none of the specimens now contain any *Aschersonia*. The type of *Aschersonia juruenis* P. Henn., Ule 2889, contains only one specimen, and that is very poorly developed; it appears to be *Aschersonia basicystis*, as far as can be ascertained without destroying the specimen, though Hennings described it as having paraphyses; another gathering, under the same name in Herb. Berlin, on *Psychotria* from Peru, Ule No. 3266, also contains only one specimen. *Aschersonia Jacarandæ* Speg. (= *A. Cheloniæ* Speg. in Herb.) *ex* Herb. Spegazzini is the pulvinate non-stalked form of *A. basicystis*. Records of "*Aschersonia oxyspora* Berk." from South America usually refer to *A. basicystis* or *A. viridans*. Two specimens of *A. basicystis* collected by Puttemans, No. 916, Alto da Serra, S. Paulo, August, 1902, in Herb. Berlin, are marked *Aschersonia Puttemansii* by Hennings.

Massee (Jour. of Botany (1896), p. 151) stated that the fungus recorded for Brazil by Berkeley under the name of *Aschersonia oxyspora* in Jour. Linn. Soc., XV., p. 394, and Decades of Fungi, No. 615* (Kew Jour. Bot., VIII., p. 278), is *Hypocrella ochracea*; the specimens, however, are *Aschersonia turbinata*.

In Herb. British Museum there are specimens of *Aschersonia basicystis* in the cover of *Fusarium hypocreoideum*, marked *Solenospora hypocreoidea* Cke. & Mass., from Jamaica, collected by Mrs. E. M. Swainson.

Distribution.—Guiana, Leprieur Nos. 580, 1,121, 1,122, in Herb. Paris. Brazil—18,784 *ex* Herb. Ign. Urban (*Hypocrella abnormis*); *Hypocrella Edwalliana*; Glaziou 18,811, *sub H. Edwalliana*; Möller 28*b* (*Moelleriella sulphurea*); Rick No. 294, *sub H. verruculosa*; Ule 2,889 (*Aschersonia juruensis*); Puttemans No. 916 (*A. Puttemansii*), all in Herb. Berlin; Glaziou 18,811, in Herb.

Paris ; Glaziou 18,806 (in part) and 18,811, *sub H. ochracea ;* Spruce No. 528 (*Hypocrea amazonica*) in part, all in Herb. Kew ; *Hypocrella coronata* in Herb. v. Höhnel. Peru, Weberbauer, No. 3,601 (*H. Weberbaueri*) ; Ule 3,266 *sub Aschersonia juruensis*, in Herb. Berlin. Argentina, *Aschersonia Cheloniæ* =*A. Jacarandæ* (*fide* Speg. *in litt.*), in Herb. Spegazzini. Cuba, Wright No. 766 (*A. basicystis*), in Herb. Kew. Trinidad, in Herb. Thaxter. Jamaica, *sub Fusarium hypocreoideum*, in Herb. British Museum.

It has been customary to refer to Montagne's species as *Hypocrella phyllogena* (Mont.) Speg., Fungi Argentini additis nonnullis Brasiliensibus Montevideensibusque. Pugillus, IV., No. 209. It is so cited in Saccardo, and by Saccardo and Berlese, Miscellanea Mycologica, p. 14, " In pagina inf. foliorum Eupatorii ageratoides, Madison, Amer. Bor. (Trelease No. 127)." But Spegazzini's specimen so named is not the *Hypocrea phyllogena* of Montagne, but *Hypocrea palmæ* Berk. & Curt., and therefore the reference is incorrect.

Figures.—Plate 2, fig. 17, specimen *ex Hypocrella sulphurea* Bres, × 6 ; Plate 2, fig. 18, *Aschersonia, ex* Herb. Paris, Leprieur, × 10 ; Plate 4, fig. 3, *Hypocrella*, pulvinate form, section, × 6 ; Plate 4, fig. 4, *Hypocrella, ex Hypocrella Edwalliana*, type, section, × 6 ; Plate 4, fig. 5, pulvinate *Aschersonia* stage, section, × 6 ; Plate 4, fig. 6, *Hypocrella, ex Moelleriella sulphurea*, type, × 6 ; Plate 4, fig. 7, *Hypocrella*,? parasitized, *ex* Herb. Theissen, × 6 ; Plate 5, fig. 58, part-spores, × 900 ; Plate 5, fig. 61, pycnospores, × 1000.

Hypocrella oxystoma (Berk.) Petch.—Perithecial stroma irregularly pulvinate, up to 1·5 mm. diameter, 0·8 mm. high, even or slightly tuberculate, pale yellow, waxy, glabrous or slightly pruinose, sometimes with a scarious or fibrillose hypothallus, ostiola not evident. Perithecia narrow-pyriform, 0·5 mm. high, 0·2 mm. diameter. Asci 320 × 8–10 μ. Part-spores narrow-oval, ends rounded, 7–10 × 2·5–3 μ. *Aschersonia* stromata discoid or columnar, up to 0·75 mm. high, 1 mm. diameter, usually surrounded by a broad scarious or slightly fibrillose hypothallus ; waxy-looking and subtranslucent when fresh, minutely tomentose when dry ; pale yellow (white in herbarium specimens), mass of spores orange-yellow, central, sometimes forming an erect column projecting above the stroma ; upper surface of stroma (when spores removed) marked with a continuous circular furrow about 0·4 mm. deep, a little within the margin ; central area often sunk below the outer ring. Pycnidia oval or convoluted in section,

situated below the furrow and opening into it by a narrow ostiolum. Pycnospores 10–15 × 2–2·5 μ, with an oval central portion and conical tapering points up to 3 μ long. *Aschersonia* stage—*Aschersonia oxystoma* Berk., Hooker's Journal of Botany, VI. (1854), p. 205.

This species was described by Berkeley under the name given above, but in the list of new species in Decades of Fungi, XLIX., L. (*loc. cit.*, p. 234), he altered the name to *A. oxyspora*, and added the footnote " not *oxystoma* as in the text." In 1856 he recorded another gathering, from Brazil, under the name *A. oxyspora*, but these latter specimens are small examples of *A. turbinata*. I have retained the original name, as none of the subsequent " *oxyspora* " records refers to the same species.

The type specimen, on leaves of some *Myrsineæ*, India, is in Herb. Kew, but only a minute fragment of one stroma remains ; a drawing by Berkeley, however, shows that it was cylindric, with an expanded base. Massee recorded that the type specimen was *Hypocrella* (Jour. of Botany, April, 1896, p. 151), and published a description under the name of *H. oxyspora*, but the spores described by him and those in the remaining fragment are the pycnospores.

This species is common in Ceylon in the jungle at Hakgala (5,600 feet), where it occurs on *Sarcococca pruniformis*, *Psychotria elongata*, *Allophylus zeylanicus*, *Acronychia laurifolia*, *Lasianthus* spp., &c. It has also been found at Maha-Iluppallama, in the low-country of Ceylon, on *Memecylon*. The host insect has not been observed. The stromata are, in general, remarkably uniform, but in a few instances pulvinate stromata, bearing three or four furrows, each producing its separate column of spores, have been found. In a collection from Hakgala, Ceylon, on *Murraya exotica*, April, 1917, the stromata are discoid, 0·8 mm. diameter, 0·6 mm. high, with a well-developed membranous hypothallus ; the top of the stroma is flat, without the usual sunken furrow, and the pycnidia are scattered, up to six, each producing a separate column of spores.

The perithecial stroma has been found on *Sarcococca pruniformis*, Hakgala, January, 1914.

Records of " *Aschersonia oxyspora* " from South America, other than Berkeley's cited above, have been found, in cases in which the specimens are available, to be *Aschersonia basicystis* or *Aschersonia viridans*.

Distribution.—India, in Herb, Kew. Ceylon, in Herb. Peradeniya.

Figures.—Plate 2, fig. 16, *Aschersonia*, Ceylon specimen, × 8 ; Plate 4, fig. 29, *Aschersonia*, section, × 6 ; Plate 4, fig. 30, section, × 6 ; Plate 5, fig 65, pycnospores, × 1000.

ALEYRODIICOLÆ.

Hypocrella ; subgenus Eu-hypocrella.

Hypocrella discoidea (B. & Br.) Sacc., Michelia, I., p. 322 (1878).—Stromata usually discoid, up to 4 mm. diameter and 1·25 mm. high, upper surface almost plane, edge vertical or rounded, sometimes umbilicate in the centre, with or without a thin, fibrillose hypothallus ; or irregularly pulvinate, 1–2 mm. diameter ; minutely pulverulent ; orange-red, or more rarely yellow, internally yellowish-white ; substance rather soft. Perithecia scattered ; ostiola red-brown, or dark brown, slightly projecting ; perithecia flask-shaped, 0·35 mm. deep, 0·15 mm. diameter ; asci 140–180 × 6–8 μ, four- or eight-spored ; part-spores 8–12 × 2 μ, cylindric, ends rounded, Pycnidial orifices sunk, each in the centre of a circular scarious area about 0·1 mm diameter, red-brown, usually circularly arranged ; pycnidia flattened-globose or laterally oval, 0·3 mm. diameter, neck short ; pycnospores narrow-oval or fusoid, sometimes slightly inequilateral, ends pointed and slightly produced, 10–15 × 1·5–2 μ ; paraphyses up to 180 μ long, rather stout, 1–1·5 μ diameter. *Hypocrea discoidea* B. & Br., Jour. Linn. Soc., XIV., p. 113 (1873) ; *Hypocrella Zingiberis* Massee, Kew Bulletin (1899), p. 174 ; *Hypocrella Zimmermanniana* P. Henn., Hedwigia (1902), p. 142 ; *Hypocrella Grewiæ* Koord., Bot. Untersuch., p. 179 (1907). *Aschersonia* stage—*Aschersonia samoensis* P. Henn., Engler's Bot. Jahrbuch., XXIII. p. 289 (1896) ; *Aschersonia cinnabarina* P. Henn., Monsunia, I. p. 37 (1899) ; *Aschersonia Napoleonæ* Pat. & Har., Bull. Soc. Myc. France, XX., p. 65 (1904).

This species is common in the East, at least in the *Aschersonia* stage. The pycnidia and perithecia are not usually found in the same stroma. Berkeley and Broome's type specimen is the *Hypocrella* stage, but immature. Nearly all the collections of

the *Hypocrella* stage are immature, the only recorded exception being *Hypocrella Grewiæ*, of which Koorders states that the spores split up into innumerable part-spores, without giving their measurements. But from Koorders' figures and his illustration of the formation of the part-spores, it is probable that these were merely pycnospores. The typical discoid form of this species is easily recognized, but it frequently occurs in very small pulvinate forms. It often occurs in company with *Hypocrella Mollii*.

Berkeley and Broome's type specimen from Ceylon is in Herb. Kew and Herb. Peradeniya ; it consists of specimens on *Zingiber* and on a dicotyledonous leaf; the latter specimens are on a black *Aleyrodes ;* the former are perithecial, but the latter contain pycnidial forms also. The Ceylon specimens on a dicotyledonous leaf were divided between Herb. Berkeley and Herb. Cooke ; both parts are now in Herb. Kew, but, probably owing to different methods of preservation, Cooke's half is orange-red, while Berkeley's is yellow. *Hypocrella Zingiberis* Massee, type in Herb. Kew from Perak, is now pale yellow with dark ostiola ; some specimens contain both perithecia and pycnidia, but both immature. *Hypocrella Zimmermanniana* P. Henn., type in Herb. Berlin, from Java, on some *Zingiberaceæ*, agrees exactly with the type of *discoidea*, except in colour, which is now yellow, but in this they match Berkeley's specimens noted above ; they have evidently been treated with alcohol which has extracted the colour and stained the paper in which they are kept ; there are no "substipitate" specimens as described by Hennings. *Hypocrella Grewiæ* Koorders, type in Herb. Berlin from Java on *Grewia microcos*, is the orange-red pulvinate form ; similar specimens also occur in Koorders' type specimen of *Hypocrella Mollii*, on *Premna*, from Java, in Herb. Berlin.

Aschersonia samoensis P. Henn., type in Herb. Berlin, on leaves of some *Rubiaceæ*, Upolu (Reinecke 61), contains typical discoid forms, surface plane, or depressed in the centre, or irregularly undulating, 1–2·5 mm. diameter and up to 0·4 mm. thick ; some have a narrow membranous hypothallus, up to 0·25 mm. wide, in others it is wanting. *Aschersonia cinnabarina* P. Henn., type in Herb. Berlin, on leaves of *Glochidion* sp., from the Philippines, contains minute pulvinate or discoid forms, 1–1·5 mm. diameter; it is on a white *Aleyrodes*. *Aschersonia Napoleonæ* Pat. & Hariot, type in Herb. Paris, on leaves of *Napoleona*, Dahomey, is typical *discoidea ;* some of the specimens are *Hypocrella*. From Herb. Pusa, I have examined the *Aschersonia* stage on teak, Burma ; on teak, Rangoon (with *Hypocrella Mollii*) ; on *Aleyrodes* on *Millettia* (?), Travancore ; and on *Aleyrodes* on *Spondias mangifera*, Chittagong.

Parkin's *Aschersonia* A. 6, p. 38, on *Aleyrodes* on *Diospyros toposia*, Ceylon, is the typical *Aschersonia* stage. Other Ceylon gatherings include specimens on *Aleyrodes* sp. on *Memecylon* on *Aleyrodes* sp. on *Zingiber*, &c.

Distribution.—Ceylon, Herb. Kew and Herb. Peradeniya. India, Herb. Pusa and Herb. Peradeniya. Burma, Herb. Pusa and Herb. Peradeniya. Malaya, Herb. Kew (*H. Zingiberis*). Java, Herb. Berlin (*H. Grewiæ ; H. Zimmermanniana*). Samoa, Herb. Berlin (*A. samoensis*). Philippines, Herb. Berlin (*A. cinnabarina*). Africa, Herb. Paris (*A. Napoleonæ*).

Figures.—Plate 2, fig. 9, *Aschersonia*, Ceylon specimen, × 6 ; Plate 5, fig. 35*a*, *Aschersonia*, section, × 4.

Hypocrella viridans (B. & C.) Petch.—Stromata discoid, circular or subpolygonal, up to 2 mm. diameter and 0·5 mm. high ; margin sometimes crenulate, sometimes surrounded by a slight powdery hypothallus ; grayish-white, becoming greenish ; minutely tomentose. Pycnidial orifices circularly arranged, sunk ; spore masses pale brown, circular or pyriform, distinct, about 0·2 mm. diameter. Pycnidia flattened-globose, or laterally oval, up to 0·4 mm. diameter, opening at first by a small pore, then widely ; pycnospores fusoid, 12–16 × 1·5–2·5 μ ; paraphyses up to 200 μ long. Perithecia scattered ; ostiola dark, slightly projecting ; perithecia flask-shaped, with a long neck, 0·3 mm. deep, 100–130 μ diameter ; asci 150 × 6–8 μ ; part-spores cylindric, ends rounded, 5–8 × 1·5–2 μ. *Aschersonia* stage.—*Hypocrea viridans* B. & C., Jour. Linn. Soc., X., p. 756 ; *Aschersonia viridans* (B. & C.) Pat., Bull. Soc. Myc. France, VII. (1891), p. 48 ; *Aschersonia disciformis* Pat., Bull. Soc. Myc. France, VIII. (1892), p. 136 ; *Hypocrea amazonica* Cooke (in part), Grevillea, XVI., p. 25 (1897) ; *Aschersonia viridula* Sacc., Ann. Myc., XI., p. 547.

All the recorded names refer to the *Aschersonia* stage only. The type specimen of *Hypocrea viridans* in Herb. Kew, from Cuba, is on a black *Aleyrodes* on *Gesneria ;* Berkeley described it as pale gray, becoming green. This green colouration is not uncommon in the case of pale-coloured species ; it has been noted in *Hypocrella phyllogena*, *Hypocrella Mollii*, &c. The cause of this change has not been ascertained, but it appears to depend on some parasitic or external agency. It is, however, fairly constant in this species. *Hypocrea amazonica* Cooke, in Herb. Kew, from Brazil, contains this species, among others ; the specimens are green, up to 1·5 mm. diameter, slightly crenulate, white internally, with large, brown, oval ostiola. The type of *Aschersonia disciformis ex* Herb. Patouillard, on *Cestrum*, Ecuador, is also on an *Aleyrodes ;* most of the specimens are crenulate, grayish-green, usually depressed in the centre, without a hypothallus. This species is attributed to *Aschersonia oxyspora* Berk.

by Spegazzini, in Fungi Puiggariani No. 475 ; the specimens are discoid, depressed in the centre, gray with a slight reddish tinge ; there is the same tinge in the centre of some of the stromata in the type of *A. disciformis*. The type of *Aschersonia viridula* Sacc., kindly lent me by Professor Thaxter, is *Aschersonia viridans;* the specimens do not differ from the normal. From the number of specimens submitted to me by Professor Thaxter, *Aschersonia viridans* would appear to be as common in Trinidad as *A. samoensis* is in Ceylon ; in one gathering none of the stromata exceed 1·25 mm. in diameter, and some have only one pycnidium ; in another, the stromata are slightly elevated in the centre ; a third gathering contains *Aschersonia* stromata, *Hypocrella* stromata, and others in which both stages occur. The *Hypocrella* stromata are exactly parallel to those of *Hypocrella discoidea.*

Distribution.—Cuba, in Herb. Kew (*Hypocrea viridans*). Ecuador, in Herb. Patouillard (*A. disciformis*). Brazil, in Herb. Spegazzini (Fungi Puigg., No. 475) and Herb. Kew (*sub Hypocrea amazonica*). Mexico (*A. viridula*). Trinidad, in Herb. Thaxter.

Figures.—Plate 3, fig. 37, *Aschersonia* stage, *ex* Herb. Spegazzini, × 8 ; Plate 3, fig. 38, *Aschersonia, ex* type of *Aschersonia disciformis,* × 8 ; Plate 5, fig. 49, *Aschersonia,* section, × 6.

Hypocrella palmicola P. Henn., in Voeltzkow, Reise Ost-Afrika, III., p. 29 (1908).—Pycnidial stroma circular, flattened pulvinate, or hemispherical, minute, 0·8–1 mm. diameter and up to 0·6 mm. high, upper surface even, or umbilicate in the centre ; minutely tomentose ; dark chestnut-brown, internally pallid or brownish ; pycnidium usually single in the centre of the stroma, laterally oval, 0·3–0·4 mm.diameter, 0·2–0·3 mm. high : pycnospores fusoid, 4–6 × 1·5 μ, ends pointed, but not produced ; paraphyses up to 130 μ long. Perithecial stroma discoid, up to 5 mm. diameter, 0·9 mm. thick in the centre, thinning out towards the margin, slightly undulating, sometimes umbilicate in the centre, dark chestnut-brown to blackish-brown, ostiola projecting or not ; perithecia broadly flask-shaped, 0·2–0·25 mm. deep, 110–130 μ diameter ; asci 80–100 × 4 μ ; part-spores cylindric, 5–7 × 1·5 μ.

The type in Herb. Berlin from "Ile aux Prunes (O. Madagaskar)" contains only one specimen. It is about 5 mm. in diameter, 0·9 mm. thick near the centre, thinning out to 0·2 mm. at the margin. The specimen is rather old, and is now blackish-brown, closely dotted with black ostiola ; internally it is brown, with an outer red-brown zone about 0·2 mm. deep. The centre is umbilicate and surrounded by pycnidia, which open into the depression. Elsewhere the stroma bears crowded perithecia

confined to the red-brown zone; with projecting ostiola. The spores in the pycnidia are fused into a brownish mass, and it is not easy to detect the paraphyses. A second gathering of this species was made by Thaxter, on *Adiantum*, Port of Spain, Trinidad. Some of the specimens are only 0·8 mm. diameter, and contain a large central pycnidium with a few perithecia round it, Others are discoid, up to 1·5 mm. diameter, and contain perithecia only ; the perithecia in these are scattered, and their ostiola do not project ; the internal red-brown zone is lacking in these specimens, but that, as in other species, may be only formed when the stroma is old. The shape of the small stromata, which are wholly or chiefly pycnidial, strongly resembles that of *A. cubensis*.

Distribution.—Madagascar, in Herb. Berlin. Trinidad, in Herb. Thaxter.

Figures.—Plate 3, fig. 31, *Hypocrella*, Trinidad specimen, × 6 ; Plate 3, fig. 32, *Aschersonia*, Trinidad specimen, × 10 ; Plate 4, fig. 19, section, Madagascar specimen, × 4.

Hypocrella Mollii Koorders, Bot. Untersuch., p. 179 (1907).—Stromata flattened-pulvinate, or scutate, usually irregularly elevated or undulating, up to 7 mm. diameter and 1·5 mm. thick, often confluent in large patches ; white, buff, or yellow ; minutely tomentose, sometimes with a byssoid margin ; substance white, rather soft. Pycnidial orifices pale brown, scattered, chiefly in the centre ; pycnidia elongated flask-shaped, up to 300 μ long, 160 μ diameter ; pycnospores fusoid, ends tapering, 8–14 × 1–1·5 μ. Paraphyses linear, up to 60 μ long. Perithecia scattered, ostiola pale to dark brown, not projecting. Perithecia flask-shaped, up to 0·5 mm. deep, 0·2 mm. diameter ; asci 180 × 6–8 μ; part-spores cylindric, ends rounded, 8–12 × 1·5–2 μ. *Hypocrella cretacea* v. Höhnel Sitzungsber. d. Kais. Akad. d. Wissensch. Wien, CXVIII., Abt. I., p. 311 (1909). *Aschersonia* stage—*Hypocrea variabilis* Currey (in part), Trans. Linn. Soc. (1876), p. 130 ; *Aschersonia confluens* P. Henn., Monsunia, I., p. 37 (1899) ; *Aschersonia phthiurioides* P. Henn., Hedwigia (1902), p. 145.

This is a common species in the Eastern Tropics, usually on a black *Aleyrodes*. It is distinguished by its regular flask-shaped pycnidia, which resemble the perithecia in shape ; both may be found in the same stroma. It occurs, often in large numbers, on bamboos, but is not confined to monocotyledons. It may be regretted that von Höhnel's appropriate name cannot be

retained. The type of *Hypocrella Mollii* on *Premna tomentosa* from Java, in Herb. Berlin, contains small specimens, associated with *Hypocrella discoidea ;* the description does not include the latter species; Koorders' measurement of the part-spores (15–17 μ) appears to be too large. The type of *Hypocrella cretacea* v. Höhnel, on *Amomum*, Java, is represented in Herb. Kew, Herb. British Museum, and Herb. Berlin ; the part-spores were 8–12 × 2 μ in the specimens examined by me. *Hypocrea variabilis* Currey, type in Herb. Kew, on *Ochlandra*, Pegu, is a mixture of *Hypocrella Mollii* (*Aschersonia* stage) and *Aschersonia badia ;* from Currey's description it is evident that he regarded these as young and old forms, respectively, of the same species ; his enlarged figure is not recognizable as either species ; the specimen is marked "*Aschersonia*" by Massee. *Aschersonia confluens* P. Henn, on *Leucosyces*, "Luzon, Manila, 13,647 Warburg," type in Herb. Berlin, contains one specimen only. *Aschersonia phthiuriodes* P. Henn., type in Herb. Berlin, on *Lepidadenia Wightiana*, Java, is typical *Hypocrella Mollii* (*Aschersonia* stage) on a black *Aleyrodes ;* in some specimens the ostiola are green, in others pale yellowish ; this variation has been noted on Ceylon specimens, both colours being found on the same stroma. Other collections examined include specimens on *Citrus decumana*, Java, *ex* Herb. Raciborski ; on *Aleyrodes* on bamboo, probably *Schizostachyum*, No. 10,838, Province of Bulucan, *ex* Herb. Bureau of Science, Philippines, with *Aschersonia badia ;* specimens associated with *Aschersonia badia*, on leaves of *Dilleniaceæ*, Annam, *ex* Herb. Patouillard ; on *Aleyrodes* on teak, Rangoon, *ex* Herb. Pusa, with *Hypocrella discoidea.*

The specimen from Marquesas, recorded by Berkeley and Broome in Fungi of Ceylon, No. 799, *sub Aschersonia placenta*, and included under that name in Herb. Kew, is the *Aschersonia* stage of *Hypocrella Mollii.*

Collections in Herb. Peradeniya includes specimens on *Aleyrodes* on *Pothos scandens*, Ceylon ; on *Aleyrodes* on a dicotyledon, Ceylon (three gatherings) ; on *Aleyrodes* on *Ochlandra*, Ceylon (four gatherings) ; on *Aleyrodes* on *Andropogon muricatus*, Ceylon ; on *Castanopsis* sp., Shan States, coll. J. H. Burkill ; on *Aleyrodes* on teak, Rangoon, with *Hypocrella discoidea.* Parkin's *Aschersonia* A. 3, p. 37, and A. 1, p. 36, are this species.

A large series collected on one occasion, on a black *Aleyrodes* on *Ochlandra*, Ceylon, presents curious abnormal forms Some specimens are scutate, *i.e.*, with a thin broad border rising gradually into the central pulvinate mass, and do not differ from other gatherings. In others the aleyrodid is surrounded by a circular or oval, irregular, swollen white ring, at a distance of a millimetre or more from the insect. These rings are sterile and up to 4 mm. in diameter, and in some cases adjacent rings coalesce. In some instances a ring of this description surrounds a typical *Mollii* stroma. It would appear that an extraordinarily luxuriant growth of the fungus has resulted in the formation of a ring round the scale instead of a pulvinate mass over it.

C. F. Baker, Fungi Malayana, No. 8, on coccids on *Astromia* sp., Mt. Maquiling, Philippines, issued as *Aschersonia lecanioides*, is apparently this species, but is immature. The specimens are up to 7 mm. diameter, and consist of almost plane, circular, tomentose stromata, in the centre of each of which are developing perithecia (?) ; the ostiola project, or are situated in small projections, but in this respect the specimens are matched by part of a gathering of *Hypocrella Mollii* on *Pothos scandens*, from Ceylon. I have what is apparently another part of the same Philippine collection, Merrill No. 7,150, in the same condition.

Distribution.—Ceylon in Herb. Peradeniya. India, in Herb. Peradeniya. Burma in Herb. Pusa and Herb. Peradeniya. Java, in Herb. Berlin (*H. Mollii*, *H. cretacea*, *Aschersonia phthiurioides*) ; in Herb. Raciborski (*H. cretacea*) ; in Herb. Kew (*H. cretacea*) ; in Herb. British Museum (*H. cretacea*). Annam, in Herb. Patouillard. Philippines, in Herb. Berlin (*A. confluens*), and Herb. Peradeniya. Pegu, in Herb. Kew (*Hypocrea variabilis*). Marquesas, in Herb. Kew (*sub A. placenta*).

Figures.—Plate 3, fig. 42, specimen *ex* type of *Hypocrella cretacea*, × 6 ; Plate 5, fig. 36, section, × 3 ; Plate 5, fig. 37, section, × 4.

Hypocrella duplex (Berk.) Petch.—Stromata pulvinate or subhemispherical, regular, up to 1·5 mm. diameter, scattered, or clustered and confluent, or coarsely tuberculate (?) ; reddish at the base, pale yellow above, slightly pruinose. Pycnidium single in each stroma, central, globose, about 0·4 mm. diameter ; pycnospores fusoid, 6–10 × 1–2 μ ; paraphyses linear, up to 80 μ long. Perithecia several in each stroma or tubercle, ostiola yellow-brown, slightly projecting. Perithecia pyriform, up to 0·5 mm. deep, 0·2 mm. diameter ; asci 8-spored ; part-spores cylindric, 4–8 × 1·5–1·75 μ. *Aschersonia duplex* Berk., in Handbook, New Zealand Flora, Pt. II., p. 623 (1867).

The type specimen in Herb. Kew, on leaves of *Astelia*, contains chiefly minute, simple stromata ; there is a tuberculate mass, with large tubercles, but it seems probable that this represents several stromata fused together. Berkeley stated that the stroma is lobed like a raspberry ; rarely simple, convex, and containing only one cell ; cells variable in size, one or more in each lobe. As far as the specimen now shows, the simple form is the more numerous ; the stromata which contain only one "cell" are pycnidial, while those which contain more than one "cell" are perithecial. Diels No. 6,444 on *Icerba brexoides*, Queensland, included under *Aschersonia australiensis* in Herb.

Berlin, is this species ; there are only two examples of the fungus ; the specimen bears the collector's note that the stromata were orange.

Distribution.—New Zealand, in Herb. Kew. Queensland, in Herb. Berlin, *sub Aschersonia australiensis.*

Figures.—Plate 3, fig. 25, *Aschersonia*, simple form, *ex* type, × 10 ; Plate 3, fig. 29, *Hypocrella*, *ex* type, × 8 : Plate 5, fig. 40, *Hypocrella*, section, × 6 ; Plate 5, fig. 41, *Aschersonia*, section, × 6.

Hypocrella tubulata Petch, n. sp.—Perithecial stromata white, minutely tomentose, varying from pulvinate, 1·6 mm. diameter, 1 mm. high, slightly tuberculate, or strongly tuberculate with rounded tubercles, 0·4 mm. diameter, to flattened pulvinate, 2 mm. diameter, 0·6 mm. high, strongly tuberculate and irregularly divided ; usually with a fibrillose or scarious hypothallus which may be 1 mm. wide in the flatter irregular forms ; ostiola slightly elevated, yellow, translucent ; perithecia from subglobose, 0·4 mm. diameter, to narrow flask-shaped, 0·2–0·4 mm. diameter, 0·4–0·7 mm. high, embedded singly in the tubercles in the flatter forms, and in the stroma in the pulvinate forms, in the latter case opening through the tubercles if present ; asci up to 200 × 8–10 μ ; part-spores cylindric with rounded ends, or narrow-oval, 7–12 × 2–2·5 μ. *Aschersonia* stromata sometimes pulvinate and even, usually a pulvinate or flattened disc up to 2 mm. diameter, from which arise columnar processes, either abruptly or gradually ; processes conical or cylindric, up to 0·6 mm. high, 0·4 mm. diameter, truncate at the apex, with a wide ostiolum which is often laterally compressed ; stroma white, minutely tomentose, with a tomentose or fimbriate margin, becoming more compact and subglabrous when old ; tissue of the columns composed of more or less parallel hyphæ ; pycnidia cylindric, globose, or lenticular, sometimes convoluted at the base, usually with a long cylindrical neck ; pycnospores fusoid, ends blunt, 8–10 × 1·5 μ ; paraphyses linear, up to 150 μ long.

This species was collected by Parkin, in the *Aschersonia* stage, on an *Aleyrodes* on *Eugenia revoluta*, Horton Plains, Ceylon, and was described by him on page 39 of his paper (*Aschersonia* C). He stated : "The mature stroma possessed a hypothallus surrounding a slightly raised yellow cushion, from which projected

upwards a short column. This bifurcated at the top into two short processes, each ending in a large opening, the pycnidial orifice. One stroma had only a terminal orifice and another had three. The pycnidium is deep and somewhat lobed at the base. The orifices were plugged with yellow-brown or olive-green gelatinous masses of conidia." The remains of this specimen are now in Herb. Peradeniya. The stromata are pulvinate, or conico-pulvinate, up to 1 mm. high, or scarcely elevated, with a narrow hypothallus ; some bear one or two short processes ; others, immature, bear numerous developing processes ; the pycnidia occur singly in each process, or in the body of the stroma ; one specimen has a large, flattened-globose pycnidium, 0·8 mm. diameter, and 0·3 mm. high, in the body of the stroma, and smaller (immature) pycnidia, 0·2–0·3 mm. diameter in its processes.

The colour of the spores in mass is usually pale yellow. The green colouration noted by Parkin is a frequent abnormality in Aleyrodiicolous species of *Aschersonia*.

The pycnidial stromata are very variable, but, in general, they may be identified by the long cylindrical neck of the pycnidium. At first glance they may be mistaken for *Aschersonia oxystoma*, with which they sometimes occur, but they are not translucent as in the latter species. The perithecial stromata include forms which resemble *Hypocrella convexa*, others approaching *Hypocrella phyllogena*, and some which resemble a group of confluent nectrias.

This species has been found recently on *Allophylus zeylanicus*, and on *Lasianthus* sp., Hakgala, Ceylon, January, 1914.

Distribution.—Ceylon, in Herb. Peradeniya.

Hypocrella Raciborskii Zimm., Centralblatt f. Bakt., Bd., VII., Abt. 2 (1901), p. 875.—Pycnidial stromata circular or oval, up to 6 mm. diameter, usually about 3 × 2 mm., flattened pulvinate, up to 1 mm. thick ; or subhemispherical, or irregularly pulvinate ; often with a broad, translucent, membranous hypothallus, up to 2 mm. broad ; white, pale yellow, or orange, rather soft, minutely tomentose, the flatter forms usually covered in the centre by a red, or red-brown, mass of spores. Pycnidia various, usually widely open, irregular, globose or lenticular, lobed cavities, up to 0·4 × 0·3 mm., sometimes flask-shaped with a well-defined neck, up to 0·6 mm. deep and 0·25 mm. diameter. Pycnidial orifices in the flatter forms usually circularly arranged and radially elongated ; in the pulvinate forms scattered and circular. Pycnospores extruded in red or red-brown masses, fusoid, ends acute, 10–14 × 1·5–2 μ ; paraphyses linear,

40–80 μ long. Ascigerous stroma developing from the pycnidial stroma, rarely distinct, consisting of globose, ovoid, or cylindric processes, arising round the margin of the flatter stromata, or anywhere on the pulvinate stromata; processes, 0·3–0·7 mm. diameter, up to 0·6 mm. high, white or yellow, pruinose, each containing one perithecium; perithecia elongated flask-shaped, 0·5 mm. deep, 0·3 mm. diameter, wall yellow, ostiolum translucent; asci up to 220 μ long, 12–16 μ diameter; part-spores cylindric, tapering slightly towards the ends, ends truncate (barrel-shaped), 8–12 × 2–2·5 μ, becoming oval, 8–10 × 3–5 μ. *Hypocrella Warneckiana* P. Henn., Engler's Bot. Jahrb., XXXVIII., p. 113 (1905); *Barya salaccensis* Rac., Bull. Akad. Sc. Cracovie (1906), p. 909. *Aschersonia* stage—*Aschersonia placenta* B. & Br., Jour. Linn. Soc., XIV., p. 89 (1873); *Aschersonia novoguineensis* P. Henn., Engler's Bot. Jahrb., XXV. (1898), p. 509; *Aschersonia javanica* Penz. & Sacc., Malpighia (1901), p. 236; *Aschersonia lecanioides* P. Henn., Hedwigia (1902), p. 145.

This species is very variable, and it is only with the help of a large series from Ceylon that it has been possible to put the various type collections together. The ascigerous form generally has well-developed processes, but in some cases these are reduced to pulvinate swellings, and in a few instances the perithecia are immersed in the pulvinate stroma. Specimens which do not bear the conidial stage exactly resemble *Hypocrella Amomi*, but the latter differs in the shape of its ascospores (part-spores). The type specimen of *Hypocrella Raciborskii* has been lost (*fide* Zimmermann *in litt.*), but Zimmermann's figure and description fit the other species placed here. Zimmermann described the perithecia near the margin as entirely immersed, but his figure No. 1 scarcely supports that, and, as already stated, this species varies in that respect. Raciborski (*loc. cit.*) noted that the outer perithecia may be almost free (*i.e.*, situated in projecting processes), while those near the centre may be more or less immersed. The type specimen of *Barya salaccensis* was collected on a scale insect on leaves of *Castanea argentea* and *Lasianthus* sp. at Salak and Gedeh, Java; the specimens, *ex* Herb. Raciborski, on *Lasianthus*, include purely pycnidial stromata, as well as those described by him; one stroma is entirely perithecial. *Hypocrella Warneckiana* P. Henn., type in Herb. Berlin, from Amani, on leaves of *Myrianthus arboreus* (Warnecke No. 368) agrees completely with the above, except that the ascospores are in some cases wound in a flatter spiral; this, however, is not constant, even in the same

perithecium. Specimens have been received, *ex* Herb. Sydow, on *Premna odorata*, Manila (coll. P. W. Graff.).

In Herb. Peradeniya there is a specimen of unknown origin, but most probably from Ceylon ; it was not seen by Parkin, and was probably collected between 1900 and 1904 ; its processes are cylindric, with a rounded apex, up to 0·6 mm. high and 0·3 mm. diameter, each containing a single perithecium ; its asci, in some examples, show the full development of the part-spores, from cylindric spores, 8–12 × 2 μ, to oval spores, 8–10 × 3–5 μ, both spores being found in the same ascus.

Another gathering of the *Hypocrella* is contained in Herb. Kew, labelled " on *Smilax barbata*, Singapore." It is apparently immature.

At the time the preliminary note on the Genera Hypocrella and Aschersonia was published the relationship of *Aschersonia placenta* to *Hypocrella Raciborskii* was not suspected. Recently, however, a large collection of *Aschersonia placenta* on an *Aleyrodes* on *Schleichera trijuga* was made at Peradeniya, which yielded both stages, and a re-examination of the herbarium specimens has left no doubt on that point. The collection was in many respects a remarkable one, as it contained the typical flat *Aschersonia placenta*, the pulvinate *Aschersonia*, which has been named *Aschersonia javanica*, and all possible forms of the ascigerous stage. It was also notable for the large number of stromata present on each leaf, in some instances so densely congregated that they had fused into continuous sheets several centimetres long. At the same time, an *Aleyrodes* on a *Murraya exotica* near by was attacked by the same fungus, and in this case the majority of the stromata were the minute convex-pulvinate form, with a few pycnidia, which has been named *Aschersonia novoguineensis*.

The typical form of *Aschersonia placenta* is readily recognized by its radially-elongated pycnidial orifices arranged regularly round the stroma ; at first these appear as red spots on the yellow stroma, but subsequently the masses of spores from adjacent pycnidia fuse and form a red-brown layer over the central portion, leaving only a narrow border free. In addition to this form, however, hemispherical or pulvinate stromata occur, in which the pycnidia are scattered ; their ostiola consequently exhibit no definite arrangement, and the spore masses remain separate. Stromata frequently occur, in which the centre is undeveloped, there being merely an annulus, bearing pycnidia, round the scale insect. Flattened and hemispherical examples may occur together, but the former are the more common ; there is no other difference between them, except that in some cases the pulvinate forms retain the yellow colour on keeping, while the stromata of the flattened form usually fade to white ; this however, is not universal, as the pulvinate forms in the types of *A. novoguineensis*, *A. javanica*, and *A. lecanioides* have all faded.

Aschersonia placenta is very near *A. Aleyrodis* Webber, but the latter has a slightly different stroma, and longer paraphyses.

Aschersonia australiensis resembles the pulvinate forms of *A. placenta*, but has smaller spores ; further examples of *A. australiensis* might prove them identical.

The hypothallus is a variable feature. In extreme cases it forms a broad, thin film, extending irregularly, and sometimes fusing with those of adjacent stromata, but in many collections there is no sign of a hypothallus.

Berkeley and Broome's type specimen, on *Loranthus*, in Herb. Kew and Herb. Peradeniya, contains circular flattened specimens up to 6 mm. in diameter. Part of the same gathering is in Herb. Paris. The specimen from Marquesas mentioned by Berkeley and Broome is *Hypocrella Mollii*. A Brazilian specimen included under *A. placenta* at Kew, labelled "*Hypocrea*, Brazil," by Cooke, is not this species. The type of *Aschersonia novo-guineensis*, on *Ficus* sp., New Guinea, in Herb. Berlin, contains minute examples, white or yellowish, oval, flattened pulvinate, about 1·5 × 1 mm., or circular and convex-pulvinate, about 1 mm. diameter, sometimes furnished with a thin hypothallus ; the pycnidia are circularly arranged and numerous in the oval forms, but few and scattered in the circular forms ; the paraphyses are 60–80 μ long, and the spores measure 10–14 × 1·5–2 μ ; this form has been gathered in Ceylon. The type of *Aschersonia javanica* from Java, kindly lent me by Professor Penzig, is in poor condition ; the leaf bore three specimens, one quite immature and merely the initial stages of a stroma, another discoid, circular, flattened, 1 mm. diameter with a hypothallus 0·1 mm. wide, in which the pycnidia were apparently undeveloped, and a third 1 mm. diameter, irregularly pulvinate, surrounded by a hypothallus 0·2 mm. wide, with three scattered pycnidial orifices ; the last-named matches several Ceylon specimens of *A. placenta*.

The type of *A. lecanioides*, on *Mangifera indica*, from Java, in Herb. Berlin, contains pulvinate specimens up to 1·75 mm. thick in the centre, and 5 mm. diameter, including a fibrillose hypothallus, 1–1·5 mm. wide. The pycnidia are scattered, and the stromata have a ring of developing perithecia round the base and on the hypothallus ; the spores and paraphyses agree with those of *A. placenta*. Another gathering, in Herb. Berlin, on *Mangifera laurina*, Buitenzorg, Java, collected by Volkens, contains exactly similar specimens, as well as the typical, flattened-pulvinate form of *A. placenta*. Koorders has recorded another collection of *A. lecanioides* from Java, on *Mangifera indica* ; this is in Herb. Berlin, but practically nothing is left of it.

Parkin's specimens A 1, on a black *Aleyrodes* on *Andropogon muricatus* ; A 2, on a black *Aleyrodes* on *Hedyotis verticillaris* ; and A 4, on a pale *Aleyrodes* on *Memecylon capitellatum*, are *Aschersonia placenta*. From Herb. Pusa. I have examined specimens on *Morus indica*, Manipur, Assam ; on an unknown leaf, Mussoorie ; and on *Aleyrodes* on *Citrus medica*, Ashkoti, Kumaon. It is exceptionally abundant in up-country districts

in Ceylon on a pale *Aleyrodes* on *Loranthus* spp., and frequent in the low-country on *Memecylon* spp. ; specimens have also been collected on *Aleyrodes* on *Murraya exotica*, on *Antidesma*, on *Lasianthus Walkeri*, on *Strychnos Benthami*, on *Diospyros Ebenum*, and on *Schleichera trijuga*.

Abnormal forms of *Aschersonia*, which evidently belong to *Aschersonia placenta*, have been observed in two localities in Ceylon, in both cases on an Aleyrodid on *Diospyros Ebenum*. In one case, in the Botanic Gardens, Peradeniya, the specimens are yellow-green or olive-green, circular or oval, pulvinate or flattened, usually with a rounded margin, but sometimes expanding into a thin hypothallus. The stroma is firm and corky, yellowish or olive internally. The pycnidia resemble those of *Aschersonia placenta*, but the spores are minute, 5–7 × 0·75–1, and the paraphyses may reach 150 μ. The mass of spores and basidia is deep yellow-brown in section. The specimens bear scattered hyphæ, some olive-green, 4 μ diameter, smooth or strongly roughened with minute warts and spines, and thin, hyaline hyphæ about 1 μ diameter ; these latter appear to penetrate between the normal thick-walled hyphæ of the stroma. Later, the stromata become covered with a "pile" consisting of conidiophores, erect, olivaceous, septate, somewhat irregular, smooth, up to 160 μ high and 4 μ diameter ; these bear oval, olivaceous conidia 9–16 × 4–6 μ. This is a *Cladosporium*, parasitic on the *Aschersonia ;* when the hyphomycete is producing conidia, the olivaceous hyphæ of the *Cladosporium* can be recognized within the tissue of the *Aschersonia*.

Another abnormal form was collected in some abundance on the same plant at Sigiriya. The collection includes (1) normal *Aschersonia placenta ;* (2) greenish-yellow, corky forms similar to those obtained at Peradeniya, but with immature pycnidia ; these bear minutely-roughened hyphæ, which are hyaline, and thinner than in the Peradeniya specimens ; some of the stromata are green only on one side ; (3) purple forms. These purple stromata are oval or circular, up to 4 mm. diameter, flattened, or pulvinate, or scutate ; the pycnidia are generally circularly arranged, and resemble those of *Aschersonia placenta*. The general colour is purple, becoming blackish above, paler and sometimes greenish-yellow at the base. In section the spore mass and basidia are deep yellow-brown, even in unopened pycnidia. In no case is there an extruded spore mass, but only a cohering mass lining the pycnidium. In general the pycnospores measure 2–4 × 0·5–0·75 μ, but sometimes they may be 5–7 × 0·75 μ. Paraphyses are generally indiscoverable, but in a few cases they occur, and are 60–80 μ long. The stromata are corky, and yellow-brown to purplish internally. The conidiophores of the parasite have not been observed in this case.

Parkin's specimen A 5, which is *Aschersonia hypocreoidea*, contains similar stromata. They are small, purple, placentiform, up to 1 mm. diameter ; the pycnidia are immature, with deep yellow-brown contents.

In the Peradeniya specimens there does not appear to be any doubt that the peculiarities of the stromata are due to the growth of the *Cladosporium*. The greenish-yellow specimens from Sigiriya are identical with these, but the purple forms from the same trees are so different that it might be suggested that either the parasite was a different species, or that the *Aschersonia* on which it grows was not *A. placenta*. On the latter point there is only the evidence that all the other specimens from the same trees are *A. placenta*, but this does not count for much, as it is not uncommon to find two or more species occurring together. But whatever the host, the condition of the contents of the pycnidia indicate that the specimens are parasitized. Similar conditions have been observed in old specimens of *Aschersonia marginata* and *A. sclerotioides*, overrun by *Meliola*, and in *Aschersonia basicystis*.

Fawcett has described a *Cladosporium* parasitic on *Aschersonia Goldiana*, but he does not note any change in the character of the stroma.

Distribution.—Ceylon, in Herb. Kew, Herb. Paris, and Herb. Peradeniya (*Aschersonia placenta*). *Hypocrella* stage, in Herb. Peradeniya. India (*Aschersonia* stage) in Herb. Pusa. Singapore, in Herb. Kew. Java, in Herb. Raciborski (*Barya salaccensis*), Herb. Penzig (*Aschersonia javanica*), and Herb. Berlin (*Aschersonia lecanioides*). New Guinea, in Herb. Berlin (*Aschersonia novo-guineensis*). Philippines, in Herb. Peradeniya. Africa, in Herb. Berlin (*Hypocrella Warneckiana*).

Figures.—Plate 3, fig. 39, *Hypocrella-Aschersonia*, Philippine specimen, × 8; Plate 5, fig. 39, *Hypocrella*, section, × 6; Plate 3, fig. 25, pulvinate *Aschersonia*, Ceylon, × 7; Plate 3, fig. 48, parasitized *Aschersonia*, Ceylon, × 10; Plate 3, fig. 52, two confluent specimens, typical *Aschersonia placenta*, colour of stroma faded, Ceylon, × 10; Plate 5, fig. 43, section, × 10; Plate 5, fig. 56, formation of part-spores, × 800; Plate 5, fig. 59, part-spores, × 900.

Hypocrella Andropogonis (P. Henn.) Petch.—Pycnidial stroma usually oval in plan, irregularly pulvinate, up to 6 mm. long, 4 mm. broad, and 1·5 mm. thick; white, minutely tomentose; margin spreading, stromata often confluent; pycnidial orifices circular or irregular, scattered; pycnidia tubular or irregularly oval, widely open, spore masses greenish-yellow, not fusing; pycnospores fusoid, 10–14 × 1·5–2 μ; paraphyses up to 140 μ long. Perithecia developed in the stroma between the pycnidia, scattered, flask-shaped, up to 0·4 mm. deep, 0·2 mm. diameter; ostiola yellow-brown, not projecting; asci 4–8-spored; part-spores cylindric, ends

rounded, 12–15 × 2 μ. *Aschersonia* stage—*Aschersonia Andropogonis* P. Henn., Hedwigia (1900), p. 139 : *Aschersonia parasitica* P. Henn., Hedwigia (1904), p. 149.

In the first examination of Hennings' types of this species I referred them to *Aschersonia Aleyrodis*, from which they appeared to differ only in their slightly longer paraphyses. A more extensive collection made by Professor Thaxter in Trinidad has shown that it is distinct, and has furnished the *Hypocrella* stage.

Aschersonia Andropogonis P. Henn., type in Herb. Berlin, on *Andropogon*, Mattogrosso, Brazil, is on an *Aleyrodes ;* the individual specimens are not up to 20 mm. long, as stated by Hennings, this measurement being due to the fusion of several stromata; there are two pieces of grass in the type, one of which bears specimens, somewhat resembling distorted developments of *A. Aleyrodis ;* the ostiola are arranged more or less circularly round the base ; the other piece bears effete specimens, with scattered ostiola. *Aschersonia parasitica* P. Henn., type in Herb. Berlin, on *Andropogon*, K. Fiebrig, Plantæ Paraguayenses, No. 779, is on a black *Aleyrodes ;* the specimens are very poorly developed and scarcely sufficient for an exact determination, but they appear to be this species.

The Trinidad collection contains a large number of specimens on a grass. The majority are *Aschersonia ;* these are white or cream, with irregular, scattered pycnidial orifices. Two specimens are somewhat ochraceous, and bear perithecia in the thickened parts of the stroma between the pycnidia. Though this species belongs to the same group as *A. Aleyrodis*, its pycnidia are, in general, more widely separated, and the masses of pycnospores do not, in the available specimens, fuse together. Potash colours a section yellow and gives a yellow extract.

Glaziou 18,812, included under *H. ochracea* in Herb. Kew, is immature *Aschersonia*, but probably this species; the stromata attain a diameter of 6 mm. A specimen in Herb. Kew from Brazil, included under *A. placenta*, is also probably referable to this species; it bears considerable resemblance to Glaziou 18,812, but is *Hypocrella*, its perithecia being filled with interlacing hyphæ; the stroma is white, almost plane, dotted with pale yellow ostiola.

Distribution.—Trinidad, in Herb. Thaxter. Brazil, in Herb. Berlin(*A. Andropogonis*). Paraguay, in Herb. Berlin (*A. parasitica*).

Figures.—Plate 2, fig. 20, *Hypocrella*, Trinidad, *ex* Herb. Thaxter: × 5 ; Plate 3, fig 53, *Aschersonia*, Trinidad, *ex* Herb. Thaxter, × 6.

Hypocrella Sloaneæ Pat., in Duss, Enum. Champ. Guadeloupe, p. 80 (1903).—Pycnidial stromata circular, 1–2 mm. diameter, discoid, consisting of a central conidiiferous disc,

surrounded by a white tomentose swollen border, or sometimes with a white tomentose central area also; conidial mass red-brown. True pycnidia absent (?), the sporiferous area flat; conidia narrow-fusoid, ends tapering and pointed, 10–14 × 0·75–1·5 μ; paraphyses linear, up to 100 μ long. Ascigerous stroma developed on the margin of the conidiiferous stroma, or independently; circular or oval, up to 4 mm. diameter or 5 × 4 mm., up to 2 mm. thick, plane or slightly pulvinate, tuberculate; tubercles rounded above, up to 0·4 mm. high, and 0·4 mm. diameter at the base; substance rather loose; white or cream coloured, ostiola dark-brown. Perithecia one in each tubercle, ostiola projecting, flask-shaped, 0·5 mm. deep, 0·3 mm. diameter; asci 200 × 8 μ; part-spores narrow-oval to fusoid, ends rounded or pointed, sometimes slightly inequilateral, 10–16 × 2–3 μ. *Hypocrella amazonica* P. Henn., Fungi Amazonici II., Hedwigia, XLIII., p. 246 (1904).

The type specimen in Herb. Patouillard, on leaves of *Sloanea* sp., Guadeloupe, is on an *Aleyrodes*. The stromata are circular or oval, pulvinate, tuberculate, now dirty brown to whitish, slightly translucent, with or without a narrow subfibrillose hypothallus; some effete *Aschersonia* stromata (?) are present, which apparently indicate that this stage may vary to a form with fairly regularly arranged pycnidia.

The description of the *Aschersonia* stage given above is taken from the type specimen of *Hypocrella amazonica* P. Henn.; this, "E. Ule, Herbarium Brasiliense, No. 3,198. On *Sterculiaceæ*, Peru. Iquitos, July, 1902," is in Herb. Berlin and Herb. Kew. This contains conidial forms, mixed conidial and ascigerous forms, and purely ascigerous forms. Some of the stromata are crowded with tubercles, others scarcely tuberculate. The mass of conidia may be circular, occupying the centre of the stroma, or ring-shaped, with central and marginal white areas; there does not appear to be any pycnidium in these, the conidiophores arising from a flat sunken area. The perithecia are embedded in the loose tissue of the tubercle and underlying stroma, except at the apex, which projects about 50 μ. The asci are chiefly immature, but some part spores, cylindric, 8–14 × 1 μ, can be found.

Distribution.—Peru, in Herb. Kew and Herb. Berlin (*H. amazonica*). Guadeloupe, in Herb. Patouillard. Trinidad, in Herb. Thaxter.

Figures.—Plate 3, fig 30, *Hypocrella*, with *Aschersonia*, *ex* type of *Hypocrella amazonica*, × 12; Plate 3, fig 40, *Hypocrella*, *ex* type of *Hypocrella amazonica*, × 8; Plate 5, fig. 38, section, *Hypocrella* and *Aschersonia*, × 4.

Aschersonia : subgenus Eu-aschersonia.

Aschersonia badia Pat., Journal de Botanique (1897), p. 370.—Stromata discoid, circular, up to 3 mm. diameter and 0·5 mm. high, sometimes with a slight whitish fibrillose hypothallus ; upper surface plane, or depressed in the centre, or occasionally radially grooved, minutely tomentose ; yellow-brown or reddish-brown, blackening when old. Pycnidial orifices dark, up to 0·1 mm. diameter, circular, arranged in a circle or scattered. Pycnidia globose, 0·25 mm. diameter, with a short conical neck, about 0·1 mm. long ; pycnospores narrow-oval or lanceolate, 10–13 × 2–2·5 μ ; paraphyses up to 100 μ long. *Hypocrea variabilis* Currey (in part), Trans. Linn. Soc., Ser. 2, Vol. I. (1876), p. 130.

The type specimen, in Herb. Patouillard, is on a Dilleniaceous plant from Tonkin ; many of the specimens are blackish-brown, but are parasitized by a *Cladosporium ;* some small white specimens in the type are *Hypocrella Mollii. Hypocrea variabilis*, in Herb. Kew, from Pegu on Bamboo, contains both *Aschersonia badia* and *Hypocrella Mollii*, as does also a specimen from the Philippines, Norzagaray, Province of Bulacan, Herb. Bureau of Science, No. 10,838. The latter specimen is on an *Aleyrodes* on bamboo ; some of the stromata have a slight whitish fibrillose hypothallus; the paraphyses reach 80 μ. Parkin's *Aschersonia* A 4, p. 37, on *Aleyrodes* sp. on *Memecylon capitellatum*, Ceylon, contains *Aschersonia badia* as well as *A. placenta.* Another Ceylon gathering, on *Aleyrodes* sp. on *Antidesma*, has the pycnidial orifices elevated in one specimen ; a single stroma of *Hypocrella discoidea* occurred with these.

Distribution.—Ceylon, in Herb. Peradeniya. Tonkin, in Herb. Patouillard. Philippine Islands, in Herb. Peradeniya. Pegu, in Herb. Kew (*Hypocrea variabilis* in part).

Figures.—Plate 3, fig. 47, Philippine specimen, × 6; Plate 5, fig. 50, section, × 6.

Aschersonia crenulata Pat. & Har., Journal de Botanique (1900), p. 244.—Stromata circular, discoid, up to 1·75 mm. diameter and 0·5 mm. high, often depressed in the centre, margin rounded and somewhat crenate or incised at the upper edge ; slightly contracted below, minutely tomentose ; pale purple-gray or purple-brown, internally fuscous. Pycnidial orifices circularly arranged, dark, sunk. Pycnidia globose,

about 0·3 mm. diameter, with a short conical neck; pycnospores fusoid, ends pointed, 10–14 × 2–2·5 μ; paraphyses up to 160 μ long. *Aschersonia tephrosiicola* P. Henn., Fl. du Bas et Moy. Congo, Vol. II., fasc. III (1908), p. 228.

The type specimen, in Herb. Paris, is on *Lonchocarpus* and *Smilax*, from West Africa. *Aschersonia tephrosiicola*, type in Herb. Berlin, is on a pale *Aleurodes* on *Tephrosia*; the specimens are discoid, but rather irregular, thinning out towards the margin and somewhat nodular; the paraphyses are up to 160 μ long. This species is very near *A. badia*, but has longer paraphyses.

Distribution.—Africa, in Herb. Paris, and Herb. Berlin (*A. tephrosiicola*).

Figures.—Plate 3, fig. 33, specimen *ex* type, × 6; Plate 5, fig. 51, section, × 10.

Aschersonia brunnea Petch, n. sp.—Stromata circular, discoid, up to 2 mm. diameter and 0·6 mm. high; sometimes depressed in the centre; dark purplish-brown, internally pale brown. Pycnidial orifices circularly arranged or scattered, blackish; pycnidia globose, up to 0·35 mm. diameter; pycnospores lanceolate, ends tapering, 16–19 × 2–2·5 μ; paraphyses up to 160 μ long. *Hypocrea amazonica* Cooke (in part), Grevillea, XVI., p. 25.

This species resembles *Aschersonia badia*, from which it differs in its larger pycnidia, larger spores and longer paraphyses. It is included in Herb. Kew under *Hypocrea amazonica* Cooke, Spruce No. 528, from Brazil.

Distribution.—Brazil, in Herb. Kew.

Figures.—Plate 3, fig. 34, specimen *ex Hypocrea amazonica* Cke. in Herb. Kew, × 10; Plate 5, fig. 53, section, × 6.

Aschersonia flava Petch, n. sp.—Stromata discoid, margin rounded, usually contracted below, up to 3 mm. diameter, 0·8 mm. thick, yellow or orange when fresh, waxy, subtranslucent, pallid and pruinose when dry, sometimes surrounded by a pruinose area on the leaf, pycnidial orifices not evident. Stroma with a loose central region in the centre of the base. Pycnidia arranged more or less in a circle, regular, pyriform, or globose with a conical neck, 0·3 mm. diameter, 0·5 mm. high, ostiola not projecting. Paraphyses linear, up to 200 μ long. Pycnospores fusoid, inequilateral, ends acute, 12–14 ×

2·5 μ. On an *Aleyrodes* on *Ochlandra*, Avissawella, Ceylon, October, 1909 ; Hapugastenna, Ceylon, October, 1909.

Distribution.—Ceylon, in Herb. Peradeniya.

Aschersonia blumenaviensis P. Henn., Hedwigia (1902), p. 27.—Stromata up to 3 mm. diameter, circular, discoid, up to 1·25 mm. thick, margin rounded above and below, constricted at the base, surrounded by a thin fibrillose hypothallus up to 1 mm. wide, upper surface sometimes umbilicate in the centre ; lemon-yellow ; minutely pruinose. Pycnidial orifices circularly arranged, circular, darker than the stroma, scarcely depressed, about 0·05 mm. diameter, with a thin, scarious margin. Pycnidia flattened-globose, up to 0·5 mm. diameter, 0·3 mm. deep, with a conical neck 0·1 mm. high ; pycnospores fusoid, ends pointed, 10–16 × 1·5–2·5 μ ; paraphyses 90–180 μ long. *Aschersonia flavocitrina* P. Henn., Hedwigia (1902), p. 307 ; *Aschersonia abnormis* P. Henn., Hedwigia (1904), p. 93 : not *Aschersonia flavocitrina* of Florida writers.

It may be regretted that the more appropriate name of *flavocitrina* cannot be retained for this species. *Aschersonia blumenaviensis*, type in Herb. Berlin, Möller No. 67, Brazil, contains old bleached specimens only ; Hennings gives the spore measurement 15–18 × 1·5–2 μ. *Aschersonia flavocitrina*, type in Herb. Berlin, on *Psidium*, Brazil, collected by Puttemans, San Paulo, contains lemon-yellow stromata ; Hennings gives the measurement of the spores as 12–18 × 2 μ, and the paraphyses 140–180 × 1–1·5 μ. This is a discoid species, with regularly arranged subglobose pycnidia as in *H. discoidea*, *A. badia*, &c., but is almost stud-shaped, owing to the contraction of the stroma below ; at first glance it may be mistaken for a very short stalked form of *A. basicystis*. It bears no resemblance to the Florida species which has been recorded under the name of *A. flavocitrina*. The type of *Aschersonia abnormis*, in Herb. Berlin, on *Bambusa*, Rio de Janeiro, Ule, 2,640, contains two examples only of the fungus : one of them is 4 mm. diameter, discoid, about 1 mm. thick in the centre, with a regular rigid margin about 1 mm. wide, interrupted on one side ; the other is 2 mm. diameter, and its margin is irregularly convoluted ; the pycnidia contain a brownish mass of spores, which are only 5–8 × 1 μ ; the paraphyses are scanty, and attain a length of 80 μ only ; it appears to be an abnormal development of *A. blumenaviensis* parallel to the small-spored, parasitized forms of *A. basicystis*, &c.

Distribution.—Brazil, in Herb. Berlin.

Figures.—Plate 3, fig. 51, specimen *ex* type of *Aschersonia flavocitrina*, × 6; Plate 5, fig. 52, section, × 5.

Aschersonia Tamurai P. Henn., Engler's Bot. Jahrb., XXXI., p. 741 (1902).—Stromata circular or oval, up to 1·5 mm. diameter, discoid or flattened pulvinate, up to 0·5 mm. thick, sometimes with a narrow, membranous or fibrillose hypothallus up to 2 mm. broad, waxy; orange, pale yellow, or white. Pycnidial orifices more or less circularly arranged, circular, few; pycnidia flask-shaped, up to 0·3 mm. deep and 0·15 mm. diameter, or subglobose; pycnospores extruded in a reddish-orange mass, fusoid, 8–12 × 1·5–2 μ; paraphyses about 50 μ long.

The type specimen, on *Quercus cuspidata*, Japan, in Herb. Berlin, contains stromata up to 2 mm. diameter, with or without a thin, membranous hypothallus; the stroma is pale yellow or white, and the spore mass orange; there are also old, black, effete specimens, in which no details are recognizable. Specimens, *ex* Herb. Sydow, on *Ilex pedunculosa*, Japan, contain stromata as in the type, others depressed in the centre, and some reduced to a horseshoe-shaped stroma surrounding the scale; some have a narrow, white, fibrillose hypothallus; this gathering is mixed with the sterile, lenticular, purple-red stroma which is frequent on *Aleyrodidæ* in the Eastern tropics (*Aschersonia zeylanica* Berk. in herb.). In Herb. Sapporo, there are specimens of *Aschersonia Tamurai* on *Aleyrodes citri*, September 4, 1906, attributed to *Aschersonia Aleyrodis*. *Aschersonia Tamurai* rather closely resembles some forms of *Aschersonia placenta*. On the present material it differs in the smaller, obscure, pycnidial orifices, not radially elongated, and in the more regular flask-shaped pycnidia.

Distribution.—Japan, in Herb. Berlin, Herb. Peradeniya, and Herb. Sapporo.

Figures.—Plate 3, fig. 36, specimen *ex* Herb. Sydow, × 10; Plate 5, fig. 47, section, × 10.

Aschersonia taitensis Mont., Ann. Sc. Nat., Ser. 3, Vol. X. (1848), p. 122.—Stromata discoid, up to 1 mm. diameter and 0·4 mm. high, minutely tomentose, without any evident hypothallus; pale yellow, with circular, or linear and curved, yellow-brown masses of spores. Pycnidia ovoid, crowded, irregularly circular or oval in section, sometimes convoluted at the base; pycnospores fusoid, ends pointed but not produced, 10–14 × 1·5–2 μ; paraphyses up to 70 μ long.

The type specimen, the only gathering, of this species is now in Herb. Paris, and a co-type in Herb. Kew. It was collected on leaves of *Cyrtandra*, Tahiti. There is a large number of examples of the fungus, but they are very small, ranging from about 0·5 mm. to 1 mm. The original description gives the size of the stroma as to 1–2 mm. In general, they are discoid, *i.e.*, circular with a flat top, but a few are slightly convex above. Montagne stated that the perithecia (*i.e.*, pycnidia) are ovoid with a short neck, the ostiola being " per rimulas extus conjunctis "; the latter feature is characteristic of *A. oxystoma*, in which the ostiola are united by a circular furrow, and it also occurs in *A. Tamurai*.

His figures show the pycnidia flask-shaped in vertical section, and circular in cross section, scattered through the stroma. In the specimen examined by me, the apparent number and shape of the pycnidia varied according to the height of the transverse section from the base. The pycnidia were crowded together, and irregular because of their proximity. In cross section they were irregularly oval or circular, frequently lobed, up to 0·3 × 0·2 mm. The lower sections showed (apparently) a greater number of pycnidia than those taken in the upper region of the stroma. It would appear, therefore, that the pycnidia are roughly ovoid, irregularly lobed, and convoluted at the base ; and they open either by a small pore or by an elongated, linear orifice. The pycnidia thus resemble to some extent those of *A. placenta*, but they do not, in the available specimens, open so widely, nor do the extruded spores fuse into a continuous mass. The fungus gives a yellow extract, and becomes yellow to orange red (in section) with potash.

In Montagne's published figure (*loc. cit.*) the spore is shown as septate, but his original drawing shows them guttulate.

This species is near *Hypocrella discoidea*, from which it differs in its crowded and irregular pycnidia. Its spores are, on the average, smaller and its paraphyses shorter, but were it not for the shape of the pycnidia it might be included in *discoidea*.

Distribution.—Tahiti, in Herb. Paris and Herb. Kew.

Figures.—Plate 3, fig. 35, specimen *ex* type, × 12; Plate 5, fig. 42, section, × 10.

Aschersonia Aleyrodis Webber, Bull. No. 13, U. S. Department of Agriculture, Div. of Veg. Phys. and Path. (1897), p. 20.—Stromata flattened pulvinate, up to 2 mm. diameter, 2 mm. thick, usually surrounded by a thin membranous hypothallus up to 1 mm. broad; minutely tomentose, rather soft, pinkish-buff or cream-coloured. Pycnidia sometimes flask-shaped, usually irregular, convoluted ; pycnidial orifices scattered or circularly arranged, circular or oval. Pycnospores fusoid,

ends rather blunt, 10–14 × 1–2 μ, extruded in coral-red or rufous masses which cover the centre of the stroma; paraphyses linear, 65–100 μ long, 0·75–1 μ diameter.

This species closely resembles *Aschersonia placenta*, from which it differs in its thicker stroma and longer paraphyses; the pycnidial orifices are usually circularly arranged and radially elongated, but, owing to the thickness and more pulvinate form of the stroma, they are not flat, as in *placenta*, but subvertical, *i.e.*, on the sloping sides of the stroma. The light and dark lengths in the paraphyses are strongly marked in some examples of this species, but, as in other species, they are not a constant feature. Florida specimens from H. J. Webber and H. S. Fawcett have been examined. A peculiar feature of these specimens, which, however, may not be constant, is the presence of a column (as seen in section) of non-sporiferous tissue in the middle of the pycnidium; in other species it is, as a rule, possible to wash out all the spores from the section, leaving only the continuous fringe of conidiophores and paraphyses; but in the specimens of *A. Aleyrodis* examined, this fringe is interrupted in the middle by a column of tissue continuous with the tissue of the stroma.

Distribution.—Florida, specimens *per* H. S. Fawcett and H. J. Webber in Herb. Peradeniya. Trinidad, *ex* Herb. Thaxter. The Japan and Formosan specimens attributed to *Aschersonia Aleyrodis* are *Aschersonia Tamurai*, *A. hypocreoidea*, and *A. Coffeæ*.

Figures.—Plate 3, fig. 44, old herbarium specimen, Florida, × 10; Plate 5, fig. 44, section, × 10.

Aschersonia hypocreoidea (Cooke & Massee) Petch.—Stromata circular or oval, up to 3 mm. diameter, almost plane, about 0·25 mm. thick, tomentose or byssoid, sometimes surrounded by a thin, membranous or powdery hypothallus, white, rarely yellow. Pycnidia in the centre of the stroma, arranged irregularly or in a circle, concave, widely open, sometimes somewhat flask-shaped and convoluted at the base; spore masses pale yellow or orange yellow, distinct or confluent; pycnospores narrow-oval or lanceolate, ends pointed but not produced, 8–13 × 2–2·5 μ; paraphyses up to 120 μ long. *Fusarium hypocreoideum* Cooke & Massee, Grevillea, XVI., p. 76 (1888); *Aschersonia Zenkeri* P. Henn., Engler's Bot. Jahrb., XXIII. (1897), p. 541.

The type specimen of *Fusarium* (*Selenospora*) *hypocreoideum* in Herb. Kew, contains small specimens, up to 1·2 mm. diameter sometimes with a powdery or membranous hypothallus up to 1·5

mm. wide. They are rather more pulvinate than is usual, and up to 0·45 mm. thick. Some are flattened-pulvinate, with scattered pycnidia, others are almost horseshoe-shaped, with circularly-arranged pycnidia. The paraphyses attain a length of 120 μ, and some show light and dark lengths. The pycnospores are narrow-lanceolate, 10–13 × 2–2·5 μ. The specimen is marked "589, on leaves of *Ficus aspera*, Brisbane." A specimen in Herb. British Museum, marked *Selenosporâ hypocreoidea* Cke. & Mass., from Linstead, Jamaica, Mrs. E. M. Swainson, is *Aschersonia basicystis*.

The type specimen of *Aschersonia Zenkeri*, on an undetermined leaf from Bipindi, Cameroons, Zenker No. 43, is in Herb. Berlin; as some of the stromata bear developing perithecia at the margin it is evidently the *Aschersonia* stage of a *Hypocrella* approaching *H. Raciborskii*; the paraphyses show well marked light and dark lengths. *Aschersonia paraphysata forma Balanseana* Sacc., *ex* Herb. Saccardo, on leaves of *Boehmeria*, Tonkin, is *A. hypocreoidea*. Parkin's specimen A 5, p. 37, on *Aleyrodes* sp. on leaves of *Flemingia strobilifera*, Peradeniya, is this species; the light and dark lengths are well-marked in some paraphyses, but not in others inthe same pycnidium; this collection contains, in addition to the usual thin forms, minute pulvinate specimens with a few central pycnidia. In another Ceylon gathering on *Aleyrodes* sp. on *Argyreia populifolia*, the stroma is sometimes a mere film, with scattered superficial spore masses. Specimens *ex* Herb. Raciborski, on *Unona* sp., Depok, Java, have also been examined. The specimens issued in Sydow, Fungi exotici exsiccati, No. 192, as *Aschersonia novo-guineensis*, on leaves of *Ficus ulmifolia*, Philippines, are *A. hypocreoidea*.

The pycnidial stage of *Hypocrella Raciborskii* differs in its pulvinate stroma, shorter paraphyses, and red-brown spore masses.

Distribution.—Ceylon, in Herb. Peradeniya. Tonkin, in Herb. Saccardo. Java, in Herb. Raciborski. West Africa, in Herb. Berlin. Philippines, in Sydow, Fungi exotici exsiccati, No. 192. Formosa, in Herb. Sapporo (*sub A. Aleyrodis*). Australia, in Herb. Kew (*Fusarium hypocreoideum*).

Figures.—Plate 3, fig. 41, Ceylon specimen, × 8; Plate 5, fig. 45, section, × 10. The processes at the margin of the stroma in fig. 41 are due to the growth of the stroma over the hairs of the leaf, and are not a normal feature of the fungus.

Aschersonia Goldiana Sacc. & Ellis, Sylloge Fungorum, XIV., p. 990 (1899).—Stromata up to 6 mm. diameter, oval or circular, flattened-pulvinate, up to 1·5 mm. thick, minutely tomentose, white or pale yellow, sometimes surrounded by a membranous hypothallus. Pycnidial orifices scattered or circularly arranged, ultimately hidden by the orange-yellow

mass of extruded spores. Pycnidia up to 0·2 mm. deep, cylindric and narrow, or concave and widely open, forming irregular shallow pits with a convoluted base; pycnospores orange-yellow in mass, fusoid or narrow-oval, ends pointed but not produced, 8–14 × 1·5–2 μ; paraphyses 50–110 μ long. *Aschersonia paraensis* P. Henn., Hedwigia (1902), p. 17; *Aschersonia flavocitrina* in Fawcett, Fungi parasitic on *Aleyrodes citri*, &c., not *Aschersonia flavocitrina* P. Henn.

Herb. British Museum contains a specimen of this on *Vitex*, Para, coll. Cockerell, which is apparently part of the type collection; it is identical with the specimen sent by Cockerell to Ellis, and now in the Everhart Herbarium. The stromata are up to 4 mm. diameter, almost plane or slightly pulvinate, white, minutely tomentose, with pale orange yellow or yellow spore masses; the pycnidia are poorly developed and irregularly distributed, the masses of spores forming irregular lines; a broad membranous hypothallus is present. The type of *Aschersonia paraensis*, on *Psidium pomiferum*, Brazil, in Herb. Berlin, contains pulvinate stromata, up to 1 mm. thick in the centre, circular, 3 mm. diameter; the pycnidia are irregularly oval, convoluted below, and when fully open constitute a convoluted pseudo-disc hidden by a thick mass of spores; the stroma is white and the pale orange mass of spores occupies the centre, leaving a narrow white margin exposed; the pycnospores are 8–12 × 1·5 μ, and the paraphyses 50–100 μ long. Herb. Berlin contains two other gatherings under the same name, one, on dead leaves, Rio Jurua, collected by Ule, and the other on *Psidium Guayava*, Jutuba, Ilha de Marajo, collected by Huber; in the latter the stromata are up to 3 mm. diameter, often confluent, pulvinate, up to 1·5 mm. thick; some have a membranous hypothallus up to 1·5 mm. wide, in others it is wanting.

From Florida I have examined specimens on *Aleyrodes citri*, Manatee, Florida (H. J. Webber), and on the same insect from H. S. Fawcett. The stromata are comparatively small, up to 2·5 mm. diameter, sometimes furnished with a broad, spreading, membranous hypothallus; in the flattened-pulvinate examples the pycnidial orifices are irregularly scattered, but in thin specimens they may be arranged regularly in a circle and radially elongated as in *A. placenta;* the spores are 8–14 × 1·5–2·5 μ, and the paraphyses, 60–100 μ long; the flattened-pulvinate specimens are exactly *A. paraensis*.

Fawcett states that the most evident distinction between *A. Goldiana* and *A. Aleyrodis*, as they occur in Florida, is in the colour. "*A. aleyrodis* is usually red or pink, while *A. flavocitrina* is yellow, and never contains any reddish pigment. The stromata of *A. aleyrodis*, under similar conditions, average less in diameter, and the pycnidial cavities are usually more sunken than in

A. flavocitrina. The spores of *A. aleyrodis* also average a little smaller than those of *A. flavocitrina.* Measurements of Florida specimens show that the spores of *A. aleyrodis* are about 9–14 × 2–3 μ, while those of *A. flavocitrina* measure about 12–15 × 2–3 μ." The paraphyses of *A. Goldiana* are slightly longer, and the stromata are thinner and do not exhibit the oblique ostiola of *A. aleyrodis.*

In Herb. British Museum there is a specimen from Venezuela : "Plantes du Haut-Orenoque, Recueillies en 1887 par A. Gaillard. No. 230 de la collection. *Fusarium salmonicolor* B. & C., sur feuilles de Psidium, village d'Atures, 9. Aout "; this is *Aschersonia Goldiana,* approaching in form *Aschersonia hypocreoidea.*

Distribution.—Florida, in Herb. Peradeniya. Brazil, in Herb. British Museum and Herb. Berlin (*A. paraensis*). Trinidad, in Herb. Thaxter. Porto Rico, in Herb. Thaxter. Venezuela, in Herb. British Museum (Gaillard, 230, *sub Fusarium salmonicolor*).

Figures.—Plate 3, fig. 46, Florida specimen, × 6 ; Plate 5, fig. 46, section, × 10.

Aschersonia australiensis P. Henn., Hedwigia (1903), p. 87.—Stromata circular or oval, up to 2 mm. diameter, flattened-pulvinate, up to 1 mm. thick, surrounded by a broad membranous hypothallus, waxy and subtranslucent ; orange-yellow or grayish-yellow. Pycnidia scattered or arranged circularly ; ostiola yellow ; pycnidia ovoid, or more or less flask-shaped ; pycnospores narrow-oval or fusoid, ends pointed but not produced, 5–10 × 1–1·5 μ ; paraphyses up to 70 μ long.

The type specimen, from Queensland, Pritzel, 79, in Herb. Berlin, is on an *Aleyrodes* on *Callistemon lanceolatus.* In the same cover is a gathering on *Icerba brexoides,* Diels, 6,444, which is *Hypocrella duplex.* The type contains pulvinate, subtranslucent stromata, sometimes depressed in the centre and displaying the scale insect ; its spores are 5–8 × 1–1·5 μ. It resembles pulvinate forms of *A. placenta,* some of which, *e.g.*, those named *A. javanica,* become subtranslucent, but differs in its smaller spores. But the available material is scanty. In Herb. Kew, *sub A. oxyspora,* there is a Queensland gathering on *Cinnamomum Olivieri* which is, in part, this species ; some of these stromata are more opaque ; the spores measure 5–10 × 1–1·5 μ.

Distribution.—Queensland, in Herb. Kew and Herb. Berlin.

Figures.—Plate 3, fig. 43, specimen *ex* type, × 10 ; Plate 5, fig. 48, section, × 10.

Aschersonia columnifera Petch, n. sp.—Stromata up to 2·5 mm. diameter, feebly pulvinate, bearing about four erect,

or suberect, columnar processes, pale yellow, minutely pruinose, total height about 0·7 mm., usually with a scarious hypothallus ; processes cylindric, often laterally compressed, up to 0·5 mm. high, 0·6×0·4 mm. in cross section ; pycnidial orifices at the apices of the processes, usually solitary, oval, rarely two and circular ; mass of pycnospores usually brownish-yellow, sometimes red-brown ; pycnidia regular, shortly cylindric, about 0·2 mm. broad and deep ; pycnospores fusoid, ends pointed but not produced, 14–20 × 2–2·5 μ ; paraphyses linear, up to 130 μ long. On an *Aleyrodes* on *Ilex dahoon*, Florida.

This species was included in a collection forwarded by Mr. H. S. Fawcett. At first sight, the stromata resemble small specimens of *Aschersonia turbinata*, from which it especially differs in the presence of paraphyses. It resembles the *Aschersonia* stage of *Hypocrella tubulata*, but has a different pycnidium and longer pycnospores. From *Aschersonia acutispora*, from Australia, it differs in the shape of the pycnospores. No other species resembling this has been seen from the Western Tropics.

Aschersonia acutispora Petch, n. sp.—Stromata yellowish, opaque, simple, cylindric, about 0·8 mm. high, 0·6 mm. diameter, with a broad scarious hypothallus, up to 1 mm. wide, or (?) botryose, with clustered processes up to 0·5 mm. high and 0·3 mm. diameter ; pycnidia (in the simple forms) single, central, flattened-globose, about 0·3 mm. high and 0·4 mm. diameter ; pycnospores narrow-oval, tapering abruptly towards the ends, 10–14 × 2–2·5 μ ; paraphyses up to 180 μ long. On an *Aleyrodes* on *Cinnamomum Olivieri*, Queensland, in Herb. Kew.

In the cover of *Aschersonia oxyspora* in Herb. Kew there is a gathering from Queensland, which is in part *Aschersonia australiensis*, and in part the present species, which differs from *Aschersonia australiensis* in the shape of the stroma and the spores. The fertile stromata are all simple, but botryose forms are also present, which appear to be the same species. Unfortunately, the botryose forms examined were immature. *Aschersonia duplex* has a similar pycnidium, but its paraphyses are shorter, and its spores a different shape. The spores of *Aschersonia acutispora* resemble those of *Aschersonia oxystoma*, but the latter does not possess paraphyses, and its pycnidia are different.

The material is scanty, but it cannot be included in any other known species.

SPECIES NON VISÆ.

Hypocrella citrina Speg., Fungi Puiggariani, No. 303, Bolet. de l' Academia Nacional de Ciencias de Cordoba, XI. (1889), p. 381.—" Stromatibus hypophyllis, sparsis vel hinc inde laxe 2–3-gregariis, hemisphærico-lenticularibus, glabris, hypothallo hyalino, pelliculoso, radiante, 3–4 mm. diam. superficiali insidentibus, superne applanatis ac sæpius papillulosis, 1–2 mm. diam. ; peritheciis globulosis, immersis, in margine stromatis sæpius constipatis, 250 μ diam.; ostiolo papillulato, non vel vix exserto : ascis cylindraceis, subfusoideis, apice rotundato-truncatis, crasse tunicatis, 1-foveolatis, deorsum breviter attenuato-pedicellatis, 120–130 × 6–8 μ, octosporis, aparaphysatis : sporidiis filiformibus, hyalinis, continuis vel rarius in articulos secedentibus, 100–110 × 1 μ. Ad folia emortua Myrtaceæ vel Xanthoxyleæ cujusdam in silvis pr. Apiahy Brasiliæ."

Theissen states (Ann. Myc., IX., p. 66) that this is *Hypocrella ochracea* Mass., but he does not appear to have seen the type specimen; the general shape would agree with that of the latter species.

Hypocrella colliculosa Speg., Fungi Puiggariani, No. 301, *loc. cit.*—" Stromatibus epiphyllis, nervisedis, subgregariis hemiphærico-colliculosis, pallide subaurantiis, glabris, 1·5–3 mm. diam., 1–1·5 mm. cr. ; peritheciis peripheriçis, globosis, 250–300 μ diam., stromate immersis, plus minus prominulis : ostiolo vix papillulato ; contextu carnuloso, indistincto ; ascis cylindraceis, apice subtruncato-rotundatis, tunica non vel vix incrassata, basi brevissime crasseque subattenuato-pedicellatis, 8-sporis, 200 × 10 μ, aparaphysatis : sporidiis filiformibus, 200 μ long., in articulos, 5–10 × 3 μ, secedentibus hyalinis. Ad folia viva Rubiaceæ arboreæ cujusdam in silvis pr. Apiahy, Brasiliæ."

Apparently not now represented in Herb. Spegazzini. The description does not apply to any known species.

Hypocrella luteo-olivacea Wint., Grevillea, XV., p. 86.—"Stromatibus subglobosis v. crasse pulvinatis, sessilibus, ramulos tenuiores conferte circumdantibus, superficialibus, facile solubilibus, sæpe mutua pressione plus minus angulatis, extus luteo-olivaceis, perithecis parum exstantibus verrucosis, intus luteis, circ. 1–3 mm. lat.; peritheciis immersis, vertice tantum prominulis, elongato-ovoideis, in collum crassum, conicum attenuatis, 150-180 μ lat.; ascis elongato-cylindraceis, deorsum stipitiformi-attenuatis, 8-sporis, 180–200 × 9 μ; sporidiis filiformibus, hyalinis, dense septatis et (in ascis) in articulos cylindricos, utrinque truncatos, 8–9 × 2·5 μ secedentibus. Ad ramulos emortuos S. Francisco in Brasilia (Ule No. 337)."

The type specimen is apparently not in Herb. Kew, Herb. British Museum, or Herb. Berlin. The description suggests *Hypocrella palmæ*. In Herb. Berlin there is a specimen, *sub H. luteo-olivacea* Wint., labelled "Brasilia: Prov. Sao Paulo: auf Myrtaceæ sp. Leg. F. Noack. Comm, P. Sydow." The stromata are subglobose, wrinkled, up to 3 mm. diameter, dirty white, with brown ostiola, which do not project; they are hard, and white internally. The perithecia are flask-shaped, up to 0·45 mm. deep and 0·15 mm. diameter; the wall of the perithecium is yellow. The part-spores are oval, 9–12 × 3–4 μ. This appears to be the *Hypocrella* form of *H. cavernosa*.

Hypocrella globosa Rac., Bull. Acad. Sci. Cracovie (1906), p. 907.—"Stromatibus globosis basi angustata in pagina superiori foliorum insidentibus, 2–3·5 mm. diameter, cartilagineis, griseo-nigris, intus albidis: peritheciis subpiriformibus et supra collo elongato præditis, 360–400 × 100–122 μ, parietibus flavo-aurantiacis, immersis sed ostiolo papilliformi, prominulis; paraphysibus nullis; ascis lineari-fusoideis, apice rotundatis, 160–190 × 8 μ, octosporis; sporidiis anguste linearibus in asco secedentibus et tunc articulis breviter cylindraceis, hyalinis levibus, 2·5–4 × 1–1·5 μ. In foliis præcipue ad nervos Castilloæ elasticæ, Buitenzorg in ins. Java."

Notwithstanding the small size given for the part-spores, this species would appear to be *Hypocrella Reineckiana*.

Aschersonia chætospora Sacc., Florula Mycol. Lusitanica, Bol. Soc. Broter. Coimbra, XI. (1893), p. 69.—"Stromatibus

hypophyllis, subsolitariis, pulvinatis, carneo-flavidis, intus pallidioribus, 1 mm. diam., carnoso-fragilibus, levibus : contextu sinuoso-celluloso ; peritheciis peripherice immersis globulosis, remotiusculis, pallide fuscellis, poro circulari ampliusculo non emergente apertis : sporulis creberrimis, fusoideis, rectis, continuis, 8 × 2 μ, hyalinis, utrinque setula recta, 4 × 1 μ acutis. In foliis nondum emortuis Sabiceæ ingratæ, S. Thome."

This, from the description, is a Lecaniicolous *Aschersonia*, apparently near *Aschersonia cubensis*.

Aschersonia paraphysata Sacc., *loc. cit. supra*,—"Stromatibus hypophyllis, subsolitariis, pulvinatis, superficialibus, levibus, intus et extus fusco-violaceis, contextu tortuoso-celluloso ; peritheciis globulosis, immersis, in quoque stromate paucis (4–8), ostiolo circulari non exserto pertusis : sporulis fusoideis, utrinque acutis sed non setigeris, continuis, 9 × 2 μ, rectis, hyalinis, basidiis bacillaribus fultis paraphysibusque filiformibus prælongis, 200–240 × 1 μ, hyalinis obvallatis. In foliis nondum emortuis Sabiceæ ingratæ, S. Thome."

The type specimen of this and the last species are on a single leaf (*fide* Saccardo *in litt.*). *A. paraphysata*, from the description, should be a species similar to *Aschersonia badia*, and the description of the stroma suggests *Aschersonia crenulata*, but it differs from all known discoid species in the length of its paraphyses. But *A. paraphysata forma Balanseana*, from Tonkin, in Herb. Sacc., is *Aschersonia hypocreoidea*, which belongs to quite a different group.

Aschersonia lauricola Speg., Mycetes Argentinenses, Ser. V., An. Mus. Nac. Buenos Aires, XX. (1910), p. 457.—" Stromata globoso-depressa, inferne cingulo loculigero cincta, superne ruga concentrica infossa etiam loculigera ornata, subsuberosa, extus rubra intus alba : sporulæ pusillæ cylindraceo-fusoideæ utrinque acutæ. Stromata 1–3 mm. diam. : loculi superi globosi, 100–150 μ diam. : sporulæ 6–8 × 1·5 μ. Ad corpora emortua Cocci (Aleurodes ?) cujusdam ad folia viva Phœbe in silvis Jujuy, Jun., 1909."

From the description this is a Lecaniicolous species, but it does not agree with any species I have seen. The description of the stroma would fit some forms of *Aschersonia basicystis*.

SPECIES DUBIÆ.

Hypocrella ? Gardeniæ P. Henn., Hedwigia (1893), p. 223.—"Stromata hypophylla pulvinata, pallide brunnea, carnulosa, 1 mm. diam., subiculo pallido insidentia : asci non visi : sporidia in articulos hyalinos fusoideis, 8–10 × 3 μ, dilabentia. In foliis Gardeniæ floridæ in horto Bogor, Java."

The note of interrogation is Hennings's. After the description Hennings wrote that, although he had made several examinations of the fungus, he had not succeeded in finding asci. On the other hand, he found spores in abundance. He was of opinion that the fungus belonged to *Hypocrella*, judging from the character of the stroma, which was exactly the same as that of *Hypocrella semen* Bres., though the spores appeared to be produced in a different manner.

The type specimen is not in Herb. Berlin. *Hypocrella semen* is not a *Hypocrella*, but a Discomycete, and if the supposed *Hypocrella Gardeniæ* resembled it, it may doubtless be rejected. But it would seem possible that the specimen may have been *Aschersonia Coffeæ*.

Hypocrella Engleriana Koord., Bot. Untersuch. (1907), p. 177.—"Stromatibus carnosis, pulvinatis, basi constrictis, extus fuscis, 0·5–1 mm. cr., hypophyllis : peritheciis immersis : ascis cylindraceis, 60–65 μ longis, 4–5 μ latis, 8-sporis ; sporidiis filiformibus asci longitudinem subæquantibus, 1 μ latis, dense minute septulatis ac guttulatis, tarde in articulos secedentibus. In foliis emortuis Mangiferæ indicæ Java."

The type specimen in Herb. Berlin bears a note which states that the fructifications are entirely immersed; that may, however, refer to the perithecia. The leaf bears two minute, black, carbonaceous bodies, pulvinate, not constricted below; it is possible that these may be effete *Hypocrella*, but they are too old for determination. There is nothing now which corresponds to Koorder's figures.

Hypocrella Tamoneæ Earle, Mycologia, II., p. 87.—"Stromata scattered, hypophyllous, 1–1·5 mm. in diameter, black (at least in aged specimens), suborbicular, crust-like, superficial; perithecia crowded, prominent, finally collapsing, 200–250 μ diameter; ostiola perforate, large, somewhat irregular : asci cylindrical, short-stipitate, 80–100 × 7–8 μ; spores thread-like, very slender, equalling in length the ascus, spirally coiled, about 80 × 0·75 μ : paraphyses numerous. On living leaves of *Tamonea* sp., Porto Rico."

In its collapsible perithecia, and in the presence of paraphyses in the perithecium, this species differs from every *Hypocrella* known. Its reference to *Hypocrella* appears very doubtful.

SPECIES EXCLUDENDÆ.

Hypocrella Bambusæ (B. & Br.) Sacc., Michelia, I., p. 323 ; *Hypocrea Bambusæ* B. &. Br., Jour. Linn. Soc., XIV., p. 113.—Stroma composite, consisting of a mass of mycelium which binds together the inner leaves of the bud and produces an external ascigerous stroma at the apex. Ascigerous stroma black, hemispherical, plane below, somewhat flattened above, about 1·5 mm. diameter, rough with close-set, conical ostiola which project up to 0·1 mm. Perithecia flask-shaped, usually close-set, sometimes wedge-shaped, regularly arranged round the periphery of the upper portion of the stroma, up to 0·6 mm. deep and 0·2 mm. diameter. Asci about 400 × 4–6 μ ; spores filiform, almost as long as the ascus, 1–1·5 μ diameter, continuous in the available specimens. On bamboo, Ceylon.

From the structure of the stroma, this species is evidently *Balansia ;* it has been described as *Balansia Bambusæ* (B. & Br.) Petch, in Ann. Perad., VI., p. 170.

Hypocrella axillaris Cooke, Grevillea, XX., p. 4.—Stroma composite, including the leaves, &c., of a lateral shoot, adherent along one side to the subtending leaf, black, pulvinate, tapering to one end, wrinkled, almost smooth, up to 5 mm. long, 3 mm. diameter, and 2 mm. high. Perithecia flask-shaped, close-set, about 0·3 mm. deep and 0·15 mm. diameter ; ostiola scarcely projecting. Asci 180 × 5 μ ; spores filiform, as long as the ascus, 1–1·5 μ diameter, septate. On grasses, Brisbane.

This species is *Balansia,* and has been described as *Balansia axillaris* (Cooke) Petch, in Ann. Perad., VI., p. 171. In Journal of Botany, 1896, p. 152, Massee stated that *Hypocrella Bambusæ* is identical with *Hypocrella axillaris,* but, except that both are *Balansia,* the two species have no resemblance to one another.

Hypocrella pulvinulus (B. & Br.) Sacc., Sylloge Fungorum, II., p. 581 ; *Epichloe pulvinulus* B. & Br., Jour. Linn. Soc., XIV., p. 111.—Sterile stroma white, composite, enclosing the bud, producing an external fertile stroma at the mouth of the leaf sheath. Fertile stroma honey-coloured, with brown subtranslucent ostiola, flattened pulvinate (flattened parallel to the stem of the plant), up to 3 mm. long, 2 mm. broad, and 1 mm. thick, pale brown internally. Perithecia flask-shaped, crowded in a distinct peripheral zone, wall rather thick, up to 0·5 mm. long, 0·15 mm. diameter ; asci cylindric,

capped, cap with a central pore, 250–300 × 5–6 μ; spores filiform, as long as the ascus, septate. On *Panicum* sp., Ceylon.

This species has the same structure as *Balansia*, but its stroma is light coloured; it has been re-described as *Balansiella pulvinula* (B. & Br.) Petch, in Ann. Perad., VI., p. 173.

Hypocrella Panici Massee, Kew Bulletin, 1899, p. 173.—Stroma 2–3 cm. long. 2 mm. diameter, black, composite, consisting of fungus hyphæ and the enclosed leaves, &c., of the shoot, adherent to a leaf along one side; perithecia crowded in a distinct peripheral zone, flask-shaped, up to 0·3 mm. high, 0·1 mm. diameter; ostiola slightly projecting; asci cylindric, 175–225 × 4–6 μ, pedicel up to 50 μ long, tapering; spores almost as long as the ascus, 1–1·5 diameter, hyaline, continuous (in the available specimens).

This species is *Balansia*, and will stand as *Balansia Panici* (Massee); as the thickness of the stroma, above the embedded leaves, &c., is only 0·7 mm., it might perhaps be transferred to *Dothichloe*, but the shape and structure of the stroma is exactly that of *Balansia brevis* (B. & Br.) v. Höhnel.

Hypocrella hypoxylon (Peck) Sacc., Sylloge Fungorum, II., p. 581; *Epichloe hypoxylon*, Peck, 27th Report, p. 108; *Balansia hypoxylon* (Peck) Atkinson, Jour. of Mycology, XI., p. 254.

This species appears to have been correctly placed by Atkinson in *Balansia*.

Hypocrella atramentosa (B. & C.) Sacc., Michelia, I., p. 323; *Hypocrea atramentosa* B. & C., Cuban Fungi No. 758; *Dothichloe atramentosa* (B. & C.) Atkinson, Jour. of Mycology, XI. p. 260.

This is the type species of the genus *Dothichloe* which includes species with stromata similar in structure to those of *Balansia*.

Hypocrella tuberiformis (Berk. & Rav.) Atkinson, Bot. Gazette (1891), pp. 256 and 258; *Dussiella tuberiformis* (Berk. & Rav.) Pat., Bull. Soc. Myc. France, VI. (1890), pp. 107-109 (in part); *Hypocrea tuberiformis* Berk. & Rav., Cooke, Grevillea, XII., p. 105.

Reference has previously been made to this much-discussed species. Whether all the forms described under these names are identical or not, it is clear from the descriptions that none of them is *Hypocrella*.

Hypocrella Cyperacearum (Berk. & Curt.) Sacc., Sylloge Fungorum, II., p. 580 ; *Hypocrea Cyperacearum* B. & C., Exot. Fungi Schwein., p. 285.

The specimens appear to be *Dothichloe*, and resemble *D. atramentosa*.

Hypocrella semiamplexa (Berk.) Sacc., Michelia, I., p. 323 ; *Hypocrea semiamplexa* Berk., Decades of Fungi, No. 483.

The stroma is about 3 inches long, parasitic on bamboo. It is apparently *Balansia*.

Hypocrella semen Bres., in Hennings. Fungi Brasilienses, II., p. 524. ; *Hypocrella Glaziovii* P. Henn., Fungi Brasilienses, II., p. 524.

These two species were described from Glaziou 18,069. The type of *Hypocrella semen* is in Herb. Berlin ; the packet contains a MSS. description by Hennings, under the name of *Hypocrea foliicola*, and is marked by Hennings "et *Helotiella Glaziovii*." The type of *Hypocrella Glaziovii*, also in Herb. Berlin, is part of the same collection.

Bresadola states that the asci of *Hypocrella semen* are 220-270 × 8–9 μ, with filiform multiseptate spores. Hennings gives the asci of *Hypocrea foliicola* as 180–230 × 7–8 μ, with bicellular spores, soon dividing into subglobose loculi, 5–6 μ diam., and those of *Hypocrella Glaziovii* as 40–50 × 10–15 μ, with pluriseptate *filiform* spores, 35–45 × 3–4 μ which divide into part spores 5–8 × 3–4 μ.

The fungus is circular, about 1 mm. diameter, flattened pulvinate, black-brown, on a slight brownish-white weft of mycelium. In section it is brownish-white at the base, above which is a dark brown convex stroma, surmounted by a paler brown peripheral zone. The lower layers consist of interwoven thin-walled hyphæ, which become parallel in the dark brown zone, and bear an upper layer of asci and paraphyses about 0·2 mm. thick. The basal layer ascends slightly up the sides. The asci are 6–8 μ diameter, 4-spored, with a rounded, not thickened apex. The spores are 120–160 × 3–4 μ, septate, with divisions 3–5 μ long, but do not show any signs of separation. The paraphyses are filiform, and fused above into an epithecium. This is evidently a Discomycete.

Hypocrella marginalis P. Henn., Engl. Bot. Jahrb. (1903), p. 49.

The type in Herb. Berlin, from East Africa, is a discomycete, co-generic with the foregoing ; the spores, as far as observed, are 1·5 μ diameter, with septa about 2 μ apart, but they appear to be immature. With the type is included a specimen from Rio Jurua (det. Hennings) which is identical with "*Hypocrella semen*."

Hypocrella obconica P. Henn., Fungi goyazenses, p. 106.

This, in the type specimen in Herb. Berlin, is a discomycete. It grew on decayed areas on the leaf, from a byssoid stroma. The hypothecium is well developed, and forms an infundibuliform cup filled with the obconic mass of asci. The spores appear to be filiform.

Hypocrella juruana P. Henn., Hedwigia, XLIV., p. 61.

The type specimen in Herb. Berlin is Ule 2,831, 2,832. Hennings described it as subdiscoid, pulvinate, convex or flattened, horny red-brown, 1–2 mm. diameter, granulato-ostiolate, pallid within; asci 150–200 × 4–5 μ; sporidia 1 μ diameter, as long as the ascus. After the description he stated that the stromata were, in general, quite immature, and only isolated sporiferous asci could be found. In the type specimen in Herb. Berlin the stromata are circular, flattened and lenticular, and as far as could be ascertained do not contain any perithecia. They are composed of thin-walled hyphæ and thus differ from *Hypocrella* in general, and they do not exhibit the characteristic *Hypocrella* scar. They appear similar to the barren stromata, common in the Eastern tropics, which Berkeley named (in Herb.) *Aschersonia zeylanica*. I have similar stromata from Trinidad *ex* herb. Thaxter.

Hypocrella Moelleriana P. Henn., Hedwigia (1897), p. 222.

Transferred to *Ascopolyporus* by Möller, Phycomyceten und Ascomyceten, p. 180.

Moelleriella nutans Rick, Ann. Myc., II., p. 105.

This has already been referred to on p. 196.

Hypocrella rubiginosa A. L. Smith, Jour. Linn. Soc., XXXV., p. 18.

This was described as occurring on the stroma of a *Hypoxylon*. The basal part, however, is not *Hypoxylon*, but *Munkia*.

Other specimens of *Munkia* examined by me exhibit, when dry, an outer "rind," about 1 mm. thick, in which the "pycnidia" are embedded, and this rind is continuous all over the stroma. In the specimen which bears *Hypocrella rubiginosa*, however the outer rind is interrupted beneath the *Hypocrella* stroma, as is shown in Miss A. L. Smith's illustration. The inner radially-arranged hyphæ grow through this gap and form the *Hypocrella* stroma. It would appear that the tissues of the supposed two fungi are continuous, and that the ascigerous portion is to be regarded as the higher stage of the *Munkia*. The structure is quite different from what would be found in the case of a *Hypocrella* parasitic on a scale insect on another fungus.

The ascigerous stroma differs from *Hypocrella* in the character of its hyphæ. Its spores are continuous and multiseptate, but it is, of course, possible that they may ultimately fall into part-spores.

Aschersonia mellea B. & Br., Jour. Linn. Soc., XIV., p. 89.

Examination of the type specimen shows that this is a small *Crepidotus*, pressed flat on the substratum; its spores measure 5–6 × 3–4 μ.

Aschersonia carpinicola E. & D., Proc. Canad. Inst. (1897), p. 63.

This was described as " Stromate convexo, erumpente, 2 mm. circ., cortice interiore innato, epidermide lacerata laxe cincto, vivo carnuloso, succineo, sicco obscure rufescente, facile deciduo ; peritheciis minutis stromate immersis, ostiolis papillatis atris erumpentibus ; sporulis ellipticis hyalinis, 15–20 × 6–8 μ basidiis brevibus. In cortice emortuo Carpini americanæ, London et Dorchester, Canada.

The mode of growth described is totally different from that of *Aschersonia*. Professor R. Thaxter informs me that it has been correctly referred to *Discula Peckiana* Sacc. by Farlow, in Bibl. Index N. A. Fungi.

Aschersonia Henningsii Koord., Bot. Untersuch. (1907), p. 213.

Koorder's figure shows multiseptate spores, from which it is evident that his fungus was not *Aschersonia*. Only a minute fragment now remains of the type specimen, but it is clear from the remnant that it is the " *Microcera* " very commonly found on the scale insects, *Aspidiotus*, *Aonidia*, &c., in the tropics. This species has since been named *Microcera Fujikuroi* by Miyabe and Sawada. Its structure differs from that of *Microcera* proper, and it is proposed to institute for it a new genus, *Pseudomicrocera*. The species will then stand as *Pseudomicrocera Henningsii*.

Aschersonia zeylanica Berk., in Herb. Kew.

This is a purple-red lenticular stroma common on scale insects in the Eastern tropics. It is circular, up to 4 mm. diameter, and about 0·75 mm. thick in the centre. All specimens seen up to the present have been sterile. Its hyphæ differ from those of *Aschersonia*. " *Aschersonia* sp. indet." on *Saccopetalum*, Coll. Koorders, Java, in Herb. Berlin, is apparently the same thing.

Aschersonia rufa (B. & Br.) Sacc., Sylloge Fungorum, III., p. 619 ; *Myrosporium rufum* B. & Br., Jour. Linn. Soc., XIV., p. 85.

The type consists of minute, flattened, pulvinate, somewhat irregular stromata. It was described as " Placentæforme, rufum, nitidum, collabens ; sporis subellipticis." Sections show that the " stroma " consists of a mass of irregularly-oval, spore-like bodies, about 12 × 10 μ.

Aschersoniopsis globosa P. Henn.

As already recorded by von Höhnel (Ann. Myc., IX., p. 171) this belongs to *Munkia* Speg. This is true of the type (E. Ule, 788), as well as of Puttemans 792, in Herb. Berlin.

Aschersonia macularis Sydow, Philippine Journal of Science, IX., Sec. C., p. 187 (1914).—" Stromatibus epiphyllis, in maculis flavo-brunneolis usque 1 cm. diam., plus minus

distincte circinatim congeste, minutis, 100–200 μ diam., globulosis, margine albido alatis, ochraceis ; pycnidiis omnino immersis ; basidiis obtusis, 12–16 μ longis, 1·5–2 μ latis ; sporulis oblongis, utrinque obtusis, continuis, hyalinis, 5–6 μ longis, 2–2·5 μ latis. Palawan, Taytay, Merrill 8,855, May, 1913. On living leaves of *Mischocarpus*."

I have examined, through the kindness of the Director, the half of this collection, Merrill, 8,855, which was retained by the Bureau of Science, Manila. The stromata, which are very small, bear some superficial resemblance to those of *Aschersonia Coffeæ*, but they do not yield any colour with potash. The stout basidia, as described above, also resemble those of *A. Coffeæ*. Sections, however, show that the fungus is not *Aschersonia*. The stromata are up to 0·6 mm. diameter, flattened-pulvinate or placentiform, 0·1 –0·15 mm. high, irregularly circular, with a very narrow margin. They are formed by hyphæ, which break through the epidermis of the leaf in a stout bundle and spread out over its surface. The context of the stroma is compact, composed of interwoven hyphæ, and there are no pycnidia. The basidia cover the whole of the surface of the stroma, including the convex sides. It appears to be a Hyphomycete, near *Tubercularia*. The spots on the leaf, in the part of the specimen seen by me, have no necessary relation to the stromata. The latter are parasitic on the leaf, but their effect appears to be confined to a small brown region beneath each stroma.

Aschersonia microspora Sacc., Atti dell' Accad. Veneto-Trentino-Istriana, X. (1917), p. 81.

Specimens in Baker, Fungi Malayana, No. 304, on *Schizostachyum*, include circular, slightly convex, compact, pale brownish stromata, up to 1·5 mm. diameter, immature ; and circular, white, flat, pruinose or fibrillose stromata, up to 2 mm. diameter. Some of the latter bear a central, orange mass of spores, others bear minute scattered masses, while on others the spores are not yet developed. When examined under a low power, the latter are seen to be covered by a white, powdery mould, which sometimes extends on to the leaf. This mould is apparently an *Oospora*, with narrow-oval spores borne terminally and laterally, about 3 × 1·5 μ. The stromata which bear minute, scattered spore-masses have this mould between the latter. On the stromata with apparently normal spore-masses covering nearly the whole surface there is no pycnidium, but the spore-bearing surface is covered with densely-packed, erect basidia, up to 12 μ high ; the spores in the mass above this are either globose, 1·5 μ diameter, or narrow-oval, 2–4 × 1·5 μ ; at the edge of the stroma, the hyphæ of the *Oospora* can be distinguished.

This gathering appears to be an abnormal development of an *Aschersonia*, due to the parasitism of an *Oospora*, similar to the cases cited under *Aschersonia placenta*. The original *Aschersonia* appears to be *Aschersonia placenta*.

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Explanation of Plates.

Plate II.

1. *Hypocrella palmæ*, × 6 ; specimen *ex* type of *Hypocrella globosa* Syd. in Herb. Berlin.
2. *Hypocrella olivacea*, flat form, × 5 ; Ceylon specimen.
3. *Hypocrella olivacea*, subglobose form, × 5 ; Ceylon specimen.
4. *Hypocrella cavernosa* (*Aschersonia* stage) viewed from above, × 6 ; specimen from Trinidad in Herb. Thaxter.
5. *Hypocrella Amomi*, × 8 ; specimen *ex* type in Herb. Raciborski.
6. *Hypocrella javanica*, smooth *Aschersonia* stage, × 6 ; specimen *ex* type of *Aschersonia Eugeniæ* Koord. in Herb. Berlin.
7. *Hypocrella Schizostachyi*, × 2 ; specimen *ex* co-type in Herb. Philippines.
8. *Hypocrella bispora*, half a stroma, × 6 ; specimen *ex* type, Herb. von Höhnel.
9. *Hypocrella discoidea* (*Aschersonia* stage), × 6 ; Ceylon specimen.
10. *Hypocrella caulium* (*H. camerunensis*), × 5 ; specimen *ex* type of *H. camerunensis* in Herb. Berlin.
11. *Hypocrella javanica*, × 6 ; Ceylon specimen.
12. *Hypocrella ceramichroa*, × 4 ; Ceylon specimen.
13. *Hypocrella caulium* (*H. camerunensis* var. *brasiliana*), × 2 ; specimen *ex* type of *H. camerunensis* var. *brasiliana* in Herb. Berlin.
14. *Hypocrella Reineckeana* (eaten on one side and showing the internal colour of the stroma), × 6 ; Ceylon specimen.
15. *Hypocrella Reineckeana*, young form with "bloom," × 6 ; Ceylon specimen.
16. *Aschersonia oxystoma*, × 8 ; Ceylon specimen.
17. *Hypocrella phyllogena*, × 6 ; specimen *ex Hypocrella sulphurea* Bres., St. Catherine's, coll. Ule.

18. *Hypocrella phyllogena* (*Aschersonia*), × 10 ; specimen *ex* Herb. Paris, Leprieur, Journ. second.
19. *Hypocrella turbinata* (*Aschersonia* stage, simple form), × 6 ; West Indies.
20. *Hypocrella Andropogonis*, × 5 ; specimen from Trinidad, Thaxter No. 18.
21. *Hypocrella scutata*, lower surface, × 5 ; specimen *ex* type Herb. Kew.
22. *Hypocrella turbinata* (*Aschersonia*, old specimen), × 4 ; West Indies.
23. *Hypocrella Reineckeana*, old specimen, partly in section, × 4 ; Ceylon specimen.

Plate III.

24. *Hypocrella epiphylla* (*Aschersonia* = *A. cubensis*), × 6 ; Florida specimen.
25. *Hypocrella duplex* (*Aschersonia* stage, simple), × 10 ; specimen *ex* type in Herb. Kew.
26. *Hypocrella scutata*, viewed from above, × 2 ; specimen *ex* type in Herb. Kew.
27. *Hypocrella convexa*, viewed from above, × 5 ; specimen *ex* type Herb. Raciborski.
28. *Hypocrella epiphylla*, × 8 ; specimen *ex* type.
29. *Hypocrella duplex*, × 8 ; specimen *ex* type in Herb. Kew.
30. *Hypocrella Sloaneæ* (with *Aschersonia* stage), × 12 ; specimen *ex* type of *Hypocrella amazonica* P. Henn. in Herb. Berlin.
31. *Hypocrella palmicola*, × 6 ; specimen from Trinidad, *ex* Herb. Thaxter.
32. *Hypocrella palmicola* (*Aschersonia* stage), × 10 ; specimen from Trinidad, *ex* Herb. Thaxter.
33. *Aschersonia crenulata*, × 6 ; specimen *ex* type in Herb. Paris.
34. *Aschersonia brunnea*, × 10 ; specimen *sub Hypocrea amazonica* Cke. in Herb. Kew.
35. *Aschersonia taitensis*, × 12 ; specimen *ex* type, Herb. Paris.

36. *Aschersonia Tamurai*, × 10 ; specimen from Japan, *ex* Herb. Sydow.
37. *Hypocrella viridans* (*Aschersonia* stage), × 8 ; specimen *ex* Herb. Speg., Fungi Puigg., No. 475.
38. *Hypocrella viridans* (*Aschersonia* stage), × 8 ; specimen *ex* type of *Aschersonia disciformis* Pat. in Herb. Patouillard.
39. *Hypocrella Raciborskii*, × 8 ; specimen from the Philippines.
40. *Hypocrella Sloaneæ*, × 8 ; specimen *ex* type of *Hypocrella amazonica* P. Henn. in Herb. Berlin.
41. *Aschersonia hypocreoidea*, × 6 ; Ceylon specimen.
42. *Hypocrella Mollii*, × 6 ; specimen *ex* type of *Hypocrella cretacea* in Herb. von Höhnel.
43. *Aschersonia australiensis*, × 10 ; specimen *ex* type, Pritzel, No. 79.
44. *Aschersonia Aleyrodis* (from old dried specimen), × 10 ; specimen from Florida, per H. S. Fawcett.
45. *Aschersonia placenta* (pulvinate form), × 7 ; Ceylon specimen.
46. *Aschersonia Goldiana*, × 6 ; specimen from H. J. Webber, Florida.
47. *Aschersonia badia*, × 6 ; specimen from the Philippines.
48. *Aschersonia placenta* (parasitized), × 10 ; Ceylon specimen.
49. *Hypocrella turbinata* (*Aschersonia* stage), × 6 ; West Indies.
50. *Hypocrella turbinata* (*Hypocrella* stage), × 6 ; Grenada, *ex* Herb. Thaxter.
51. *Aschersonia blumenaviensis*, × 6 ; specimen *ex* type of *A. flavocitrina* in Herb. Berlin.
52. *Aschersonia placenta* (two specimens confluent), × 10 ; Ceylon specimen.
53. *Hypocrella Andropogonis* (*Aschersonia* stage), × 6 ; specimen from Trinidad *ex* Herb. Thaxter.
54. *Hypocrella botryosa*, × 8 ; specimen *ex* type in Herb. Sydow.

Sections of Stromata, &c., partly diagrammatic.

Plate IV.

1. *Hypocrella palmæ* (*Fleischeria paulensis*, type), × 3.
2. *Hypocrella palmæ* (*H. globosa* Syd., type), × 3.
3. *Hypocrella phyllogena*, pulvinate form, × 6.
4. *Hypocrella phyllogena* (*H. Edwalliana*, type), × 6.
5. *Hypocrella phyllogena*, pulvinate pycnidial form, × 6.
6. *Hypocrella phyllogena* (*Moelleriella sulphurea*, type), × 6.
7. *Hypocrella phyllogena*, ? parasitized, *ex* Herb. Theissen, × 6.
8. *Hypocrella scutata*, × 3.
9. *Hypocrella epiphylla*, × 6.
10. *Hypocrella Reineckiana*, with tubular pycnidia, × 3.
11. *Hypocrella Reineckiana*, × 6.
12. *Hypocrella caulium*, × 3.
13. *Hypocrella caulium* var. *brasiliana*, × 4.
14. *Hypocrella cavernosa* (after Möller), × 1½.
15. *Hypocrella verruculosa* (after Möller), × 2.
16. *Hypocrella Gartneriana* (after Möller), × ⅔.
17. *Hypocrella Schizostachyi*, nat. size.
18. *Hypocrella botryosa*, × 4.
19. *Hypocrella palmicola*, × 4.
20. *Hypocrella bispora*, × 6.
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23. *Hypocrella javanica*, × 3.
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25. *Hypocrella olivacea*, × 4.
26. *Hypocrella olivacea*, × 4.
27. *Hypocrella ceramichroa* (type), × 3.
28. *Hypocrella ceramichroa*, × 3.
29. *Aschersonia oxystoma*, × 6.
30. *Aschersonia oxystoma*, × 6.
31. *Aschersonia cubensis*, × 6.
32. *Aschersonia cubensis*, × 3.
33. *Aschersonia turbinata*, small form, × 6.
34. *Aschersonia turbinata*, × 6.
35. *Hypocrella turbinata* (after Thaxter).

Plate V.

35A. *Hypocrella discoidea* (*Aschersonia* stage), × 4.
36. *Hypocrella Mollii*, × 3.
37. *Hypocrella Mollii*, × 4.
38. *Hypocrella Sloaneæ*, × 4.
39. *Hypocrella Raciborskii*, × 6.
40. *Hypocrella duplex*, × 6.
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52. *Aschersonia blumenaviensis*, × 5.
53. *Aschersonia brunnea*, × 6.
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55. Apex of ascus and spores of *H. palmæ*, × 600.
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58. Part-spores of *H. phyllogena*, × 900.
59. Part-spores of *H. Raciborskii*, × 900.
60. Part-spores of *H. Amomi*, × 900.
61. Pycnospores of *H. phyllogena*, × 1000.
62. Pycnospores of *H. olivacea*, × 1000.
63. Pycnospores of *H. javanica*, × 1000.
64. Pycnospores of *H. turbinata*, × 1000.
65. Pycnospores of *A. oxystoma*, × 1000.

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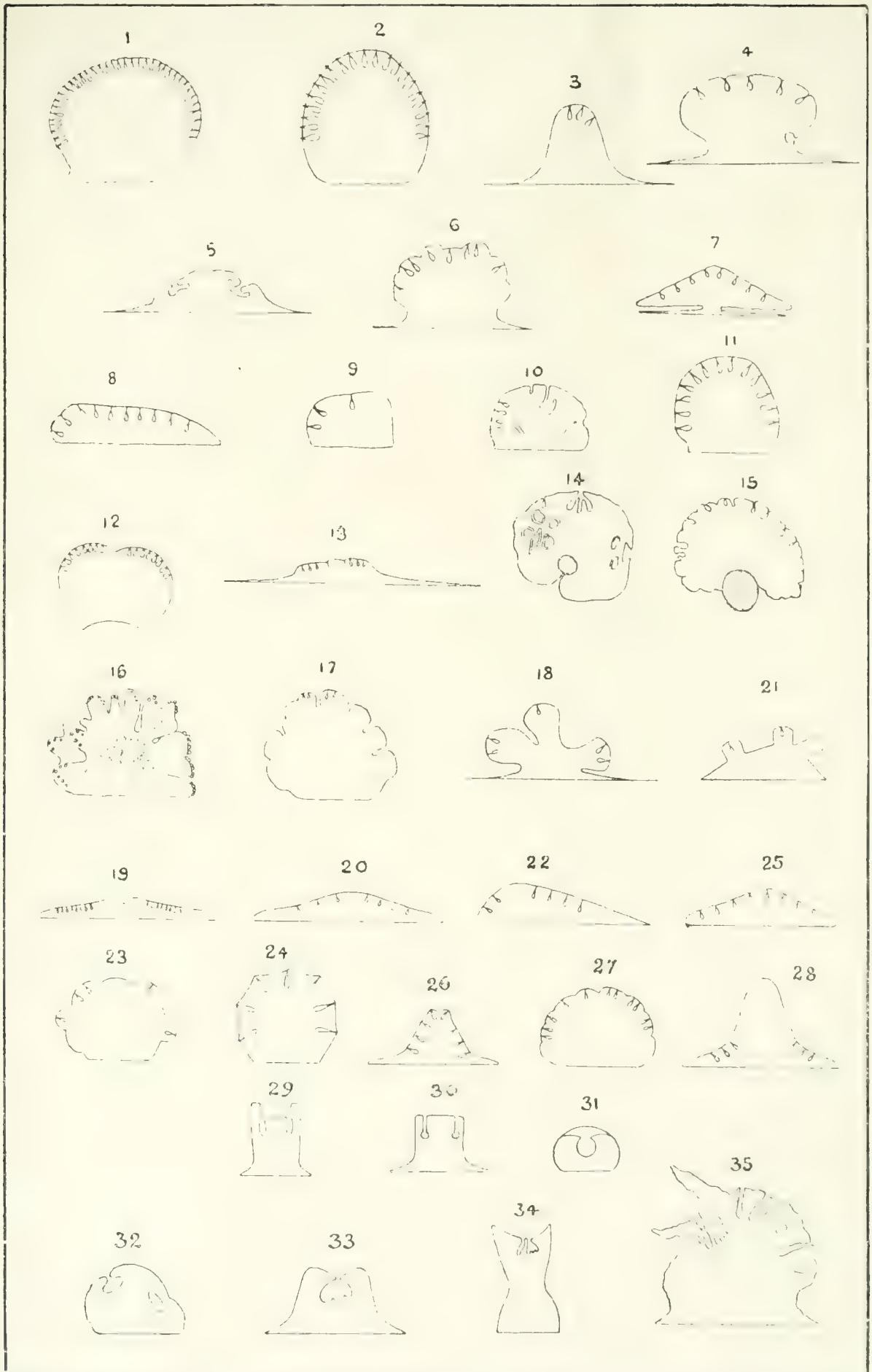

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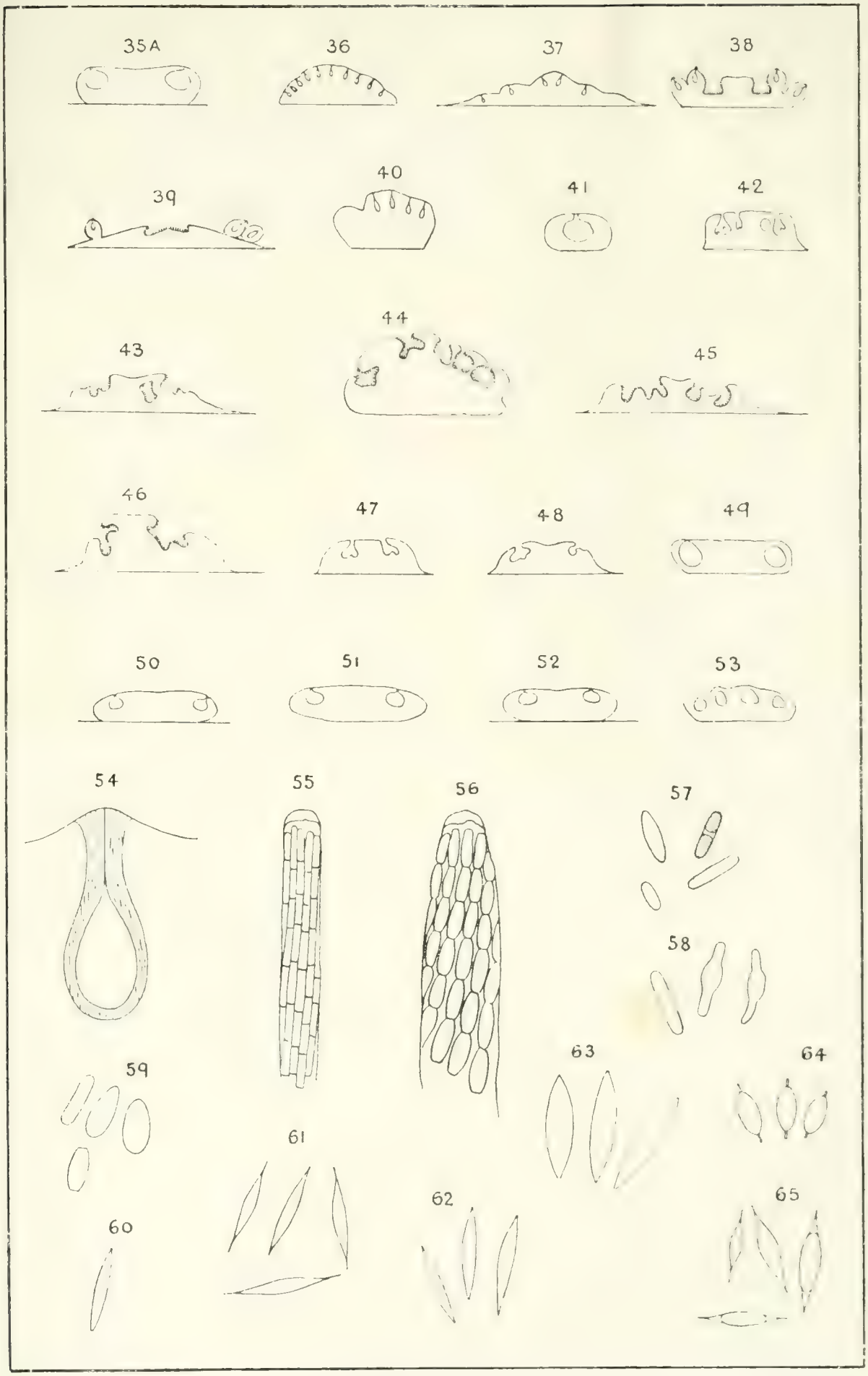

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DEPARTMENT OF AGRICULTURE, CEYLON.

ANNALS

OF THE

ROYAL BOTANIC GARDENS, PERADENIYA.

EDITED BY

T. PETCH, B.A., B.Sc.

VOLUME VII., PART IV., JUNE, 1922.

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GARDEN

Additions to Ceylon Fungi (II.).

BY

T. PETCH, B.A., B.Sc.

Hymenomycetæ.

Agaricaceæ.

Clitocybe sordida n. sp.

Pileus up to 4·5 cm. diameter, infundibuliform, or in small examples almost plane and depressed in the centre, margin at first incurved, gray-brown or gray, densely covered with minute black particles, or black-brown in the centre and radially streaked with black-brown, margin at first white. Stalk up to 4 cm. high, 4 mm. diameter, equal or slightly inflated at the base, stuffed, livid brownish-gray with dark brown fibrils and points. Gills white, or faintly cream, crowded, narrow, decurrent, terminating on the stem at a definite line, which is dark brown in old specimens. Spores white, oval, 5 × 3 μ. Strong smell of meal.

On the ground, sometimes connate at the base, Hakgala, December, 1917 ; No. 5592 in Herb. Peradeniya.

Mycena longiseta v. H.

On bark of a jak tree, Peradeniya, December, 1914 ; No. 4378 in Herb. Peradeniya, &c.

The hairs on the pileus in the Ceylon specimens are at first hyaline, then yellow-brown.

Omphalia straminea n. sp.

Pileus up to 5 mm. diameter, broadly convex, or truncated conoid, 2 mm. high, umbilicate, straw-coloured, appearing striate when moist, minutely squamulose. Stalk up to 2 cm. high, 0·75 mm. diameter, expanded towards the apex, pale straw-coloured to whitish, smooth, stuffed. Gills distant, broad, arched, decurrent, white. Spores white, oblong-oval, 6–8 × 3 μ. Cystidia scanty, fusiform to flask-shaped, 25–30 × 6 μ.

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Among moss, Nuwara Eliya, December, 1917 ; No. 5601 in Herb. Peradeniya. Resembles *Omphalia fibula*, but does not become plane.

Hygrophorus diversicolor n. sp.

Gregarious, sometimes connate at the base. Pileus up to 5 cm. diameter, almost plane, umbilicate in the centre, sometimes irregularly infundibuliform, olive-brown to black-brown, the cuticle broken into minute closely adpressed scales and fibrils, usually perforated in the centre ; flesh yellow. Stalk up to 3·5 cm. high, 1 cm. diameter, usually flattened and lacunose, expanding upwards or equal, smooth, hollow, at first greenish-yellow, becoming pale purple-gray or purple-black. Gills greenish-yellow to ochraceous, distant, ventricose, veined, thick, somewhat dry and brittle, decurrent, the tissue between the gills yellow and contrasting strongly with the purple-gray of the stalk. On the ground, Henaratgoda, July, 1917 ; No. 5226 in Herb. Peradeniya.

Hygrophorus mutabilis n. sp.

Pileus up to 3 cm. diameter, conical, orange-red, minutely silky striate, margin irregular. Stalk up to 6 cm. high, 5 mm. diameter, equal or slightly attenuated upwards, longitudinally striate, twisted, slightly fibrillose, orange-yellow, paling towards the base, stuffed. Gills pallid, or yellow with a broad pallid edge, becoming lavender with a white edge, moderately distant, ventricose, free, but close to the stem. Spores white, globose, 6–8 μ diameter. Every part turns black when bruised ; stains paper black. Differs from *H. conicus* in the colour of the gills.

Hakgala, December, 1917 ; No. 5596 in Herb. Peradeniya.

Hygrophorus similis n. sp.

Pileus up to 2 cm. diameter, hemispherical, crimson or orange-red, sometimes streaked, even, not depressed or umbonate. Stalk up to 3 cm. high, 2 mm. diameter, orange-yellow, glabrous, slightly white tomentose at the base, internally yellow, stuffed. Gills arched, decurrent, orange-yellow, becoming flesh-coloured with a paler edge. Spores white, oblong-oval, 6 × 4 μ.

On the ground in jungle, Hakgala, January, 1918 ; No. 5580. The colour of the pileus resembles that of *H. roscostriatus*, but that of the gills is different. It does not blacken when bruised.

Russula fusco-grisea n. sp.

Pileus up to 8 cm. diameter, almost plane, centre depressed, blackish-gray or blackish-brown in the centre, elsewhere gray or brownish-gray, paling towards the margin, with a viscid separable pellicle ; margin strongly tuberculato-striate. Flesh white, spongy. Stalk white, equal, expanding slightly at the apex, dry, slightly shining, solid, up to 4 cm. high, 1·3 cm. diameter. Gills white, becoming faintly cream, discoloured where bruised, fragile, distant, adnate or sinuato-adnate, sometimes forking near the stem, lower edge straight or slightly arcuate. Spores white, oval or globose, echinulate, with a rather long apiculus, 6–8 × 5 μ.

On the ground, Hakgala, August, 1918 ; No. 5788 in Herb. Peradeniya.

Cantharellus decurrens n. sp.

Pale ochraceous, orbicular, about 6 mm. diameter, plane or repand, minutely rugose ; lower surface slightly darker than the upper. Stalk lateral, but with the pileus descending on either side, short, attenuated below, minutely pruinose. Gills few, simple or forked, narrow, edge obtuse.

On dead twigs, Henaratgoda, September, 1917 ; No. 5347 in Herb. Peradeniya.

Phlebophora hyalina n. sp.

Pileus hemispherical or campanulate, up to 5 mm. diameter. depressed in the centre, membranous, whitish hyaline, radially silky, margin fimbriate, lower surface even. Stalk hyaline, translucent, tomentose, expanding slightly at the apex, curved, up to 5 mm. high, 0·5–1 mm. diameter. Basidia clavate, 24 × 5 μ, four-spored. Spores oval, inequilateral, apiculate, white, 7 × 4 μ.

On rotten wood, Hakgala, April, 1919 ; No. 5951 in Herb. Peradeniya.

Lenzites japonica Berk.

Peradeniya, November, 1916 ; No. 4956 (det. Lloyd).

Claudopus repens n. sp.

Resupinate, sessile, orbicular, up to 4 mm. diameter; margin white, tomentose; hymenial surface pinkish-red; gills few, distant. Spores irregularly globose, nodular, with a stout conical apiculus, 6–8 × 4–6 μ.

On the under side of rotting logs, growing from white cords of mycelium which spread out here and there into cobwebby sheets. Hakgala, December, 1917; No. 5621 in Herb. Peradeniya.

Pluteus flavomarginatus n. sp.

Pileus 2 cm. diameter, convex, sometimes slightly umbonate, orange-red, sometimes with deeper crimson streaks radiating from the centre, margin yellow. Gills white, then pink, broad, somewhat ventricose, free. Stalk 3·5 cm. high, 2 mm. diameter, yellow, glabrous, slightly tomentose at the base. Spores pink, subglobose, 5–6 × 4–5 μ.

On dead wood, Hakgala, March 29, 1907, &c.

Pholiota badia n. sp.

Fasciculate. Pileus 7–20 cm. diameter, undulating, feebly umbonate, bay-brown, rather darker in the centre, or yellow-brown in the centre becoming pallid towards the margin, glabrous, cuticle sometimes radially puckered, sometimes splitting; flesh white, thick (2·5 cm.) over the stalk, rapidly thinning out, with a translucent, thick (5 mm.) brown cuticle, which forms the total context over the outer third of the pileus. Stalk 6–12 cm. long, 5–16 mm. diameter, equal, innately longitudinally fibrillose, the outer layers splitting, solid, pallid becoming brownish, longitudinally ridged above the ring; ring ample, fragile, evanescent. Gills sinuato-decurrent, moderately crowded, pallid, then feebly purple-brown, narrow, attenuated outwards, edge irregularly crenate. Spores dark yellow-brown in mass, pale yellow-brown when magnified, oblong-oval, smooth, 9–14 × 5–7 μ.

Growing from a cavity in the stem of *Zanthoxylum Rhetsa*, Peradeniya, November, 9, 1917; July 4, 1921, &c. Type, No. 5482 in Herb. Peradeniya.

Polyporaceæ.

Boletus xylophilus n. sp.

Pileus convex, in the larger undulating and slightly depressed in the centre, margin incurved, up to 12 cm. diameter, dark russet-brown, or yellow-brown, minutely scurfy, sometimes areolated; flesh up to 2·5 cm. thick, pale yellow, rapidly changing to blue when cut, colour soon fading, sometimes first becoming purple-red. Pore surface yellow, or greenish-yellow, blue when bruised, with a deep sinus round the stalk, and a few pores decurrent on the stalk; pores up to 1 cm. deep, mouth oval, 0·4 mm. diameter. Stalk up to 7·5 cm. high, 2 cm. diameter, almost equal, or attenuated upwards, red-brown, paler towards the apex, with longitudinal anastomosing streaks, minutely pruinose. Spores broadly oval, sometimes flatter on one side, smooth, brownish-yellow, 4–5 × 3 μ. Mycelium sulphur-yellow, sometimes ascending the base of the stem.

Round decaying stumps, or on rotting logs, Urumuwela, 1906; Peradeniya, November, 1909; Eladuwa, June, 1910; type in Herb. Peradeniya, No. 5812, Peradeniya, November, 1918. Specimens, probably this species, up to a foot in diameter, have been seen in a damaged condition in the low-country.

Boletus aureomycetinus Baker and *Boletus pernanus* Baker, from Singapore, which both have yellow mycelium, differ, *inter alia*, in not changing colour when broken.

Boletus sylvestris n. sp.

Pileus 3 cm. diameter, pale bay-brown, rather darker in the centre, convex, centre slightly depressed, dull, minutely pruinose; flesh rather thick, white, turning brownish when cut. Stalk equal, curved, stuffed, 3·5 cm. long, 4 mm. diameter, brownish, whitish at the base, yellow at the apex, covered with minute red-brown points. Pore surface greenish-yellow, with a deep sinus round the stalk; pores 4 mm. long, mouth angular, up to 0·5 mm. diameter.

On the ground in jungle, Hapugastenna, October, 1909; No. 2990 in Herb. Peradeniya.

Polyporus dichrous Fr.

Yatiellagalla, July, 1917 ; No. 5424 (det. Lloyd).

Polyporus stereinus Berk.

Pundaluoya, October, 1917 ; No. 5384 (det. Lloyd).

Polyporus non-gravis Lloyd.

Peradeniya, December, 1914 ; No. 4462 (det. Lloyd).

Polyporus colossus Fr.

Tirrukovil, December, 1918 ; No. 5827. Anuradhapura, December, 1919. This species appears to be very common on the east of the Island during the rains of the north-east monsoon, but it has not yet been found on the western side, where rain falls in both monsoons.

Polyporus resinaceus Boud.

Hakgala, April, 1919 ; No. 6040 (det. Lloyd).

Polyporus Mangiferæ Lev.

Habarana, November, 1918 ; No. 5823 (det. Lloyd). A form of *Fomes lucidus* (Leys.) Fr.

Polyporus abruptus Berk.

Peradeniya, November, 1914 ; No. 4249. Henaratgoda, August, 1916 ; No. 4902. Tebuwana, September, 1916, No. 4907. (All det. Lloyd).

Polyporus molliculus Lloyd.

Hakgala, April, 1919 ; Nos. 5967, 5968.

Polyporus fumoso-olivaceus Lloyd.

Diyatalawa, July, 1917 ; No. 5381 (det. Lloyd).

Polyporus velutinosus Lloyd.

Peradeniya, August, 1916 ; No. 4904 (det. Lloyd). Kurunegala, October, 1916 ; No. 5382 (det. Lloyd).

Polyporus intactilis Lloyd.

Hakgala, May, 1912 ; No. 3448 (det. Lloyd).

Polyporus Clemensiæ Murrill.

Pundaluoya, October, 1917 ; No. 5383 (det. Lloyd). Kiriwanaketiya, December, 1917 ; No. 5450 (det. Lloyd).

Polyporus inornatus n. sp.

Pilei dimidiate, small, orbicular, 2·5 × 1 cm., rather thick, margin obtuse, often united laterally and decurrent in long resupinate patches, white, with a brown tinge towards the base of the pileus, radially silky or minutely tomentose; hymenium white, becoming pinkish when dry; pores small, dissepiments thin. The edge of the pileus turns red when bruised.

On dead wood (fence posts), Henaratgoda, August, 1916; type, No. 5154 in Herb. Peradeniya. Also 4903 in Herb. Peradeniya.

Fomes imitator n. sp.

Conchoid, dorsally attached, more or less circular in plan, up to 3 cm. diameter, 8 mm. thick, cream-coloured to pale ochraceous, with a black patch extending from the point of attachment, concentrically grooved, glabrous; hymenium concave, margined, "glancing"; pores small, dissepiments thin; context white or cream, very thin, almost the whole thickness of the fungus consisting of layers of pores.

Hakgala, April, 1919; No. 6061 in Herb. Peradeniya. Resembles *Fomes ochroleucus*, but differs in its pore surface and internal structure.

Fomes yucatanensis Murrill.

Hakgala, April, 1919; No. 6050 (det. Lloyd).

Fomes pachyphlœus Pat.

Peradeniya, October, 1916; No. 4946 (det. Lloyd).

Fomes atro-albus P. Henn.

Hakgala, April, 1919; No. 5964.

Polystictus cinerascens Lév.

Henaratgoda, July, 1917; No. 5426 (det. Lloyd).

Polystictus tenuiculus Lloyd.

Peradeniya, October, 1916; No. 4927 (det. Lloyd).

Poria endoxantha n. sp.

Rose-pink to salmon-pink when fresh, with a white margin, becoming brown or blackish-brown when bruised; internally sordid-yellow. Widely effused. Total thickness up to 4 mm.,

pore layer stratose, basal layer dirty-yellow, soft, about 1 mm. thick. Pores when fresh, minute, rounded, about 0·1 mm. diameter, dissepiments thick, fleshy.

On dead wood, Golinda, August, 1918 ; No. 5781 in Herb. Peradeniya. When fresh resembles *Aleurodiscus Peradeniæ* B. & Br.

Poria rubescens n. sp.

White, becoming red when bruised, and brownish-red when dry. Widely effused, soft, up to 0·8 mm. thick, with a thin byssoid basal layer, 0·1 mm. thick ; margin narrow, white, tomentose ; dissepiments thick when fresh, becoming thin and rigid when dry ; pores when dry angular, varying greatly in size, from 0·1 to 0·4 mm. diameter. No cystidia.

On rotten wood in large patches, Hakgala, No. 5546, December, 1917 ; No. 5995, April, 1919. Indistinguishable from the *Poria* form of *Polyporus interruptus* B. & Br. until bruised.

Poria albocitrina n. sp.

Effused ; lemon-chrome, with white pore mouths, and therefore appearing white when viewed obliquely ; margin narrow, white, fimbriate ; basal layer very thin, white ; pores up to 4 mm. long, subangular, about 0·2 mm. diameter. Substance moist when fresh. Habit and texture of the *Poria* form of *Polyporus interruptus*.

On dead wood, Kiriwanaketiya, December, 1917 ; No. 5434 in Herb. Peradeniya.

Poria sulphurea n. sp.

Sulphur-yellow with a broad, white, thin, effused, byssoid margin, becoming ochraceous without evident margin. Total thickness 0·5 mm., basal layer almost wanting. Pores oval or circular, up to 0·2 mm. diameter, edge irregular.

On dead wood, Hakgala, April, 1919 ; No. 5991 in Herb. Peradeniya. The fungus forms at first a widely effused, thin, white, byssoid patch, on which the pores are subsequently developed.

Trametes Meyeni Klotzsch.

Peradeniya, June, 1916 ; No. 4910 (det. Lloyd).

Trametes picta Berk.

Hapugastenna, October, 1909; No. 2966 (det. Lloyd).

Trametes straminea Pat.

Peradeniya, March, 1917; No. 4992 (det. Lloyd).

Trametes nubila Fr.

Pitakande, Ambagamuwa, March, 1918; No. 5559 (det. Lloyd).

Trametes roseola Pat.

Pallegodde, January, 1912; No. 3317 (det. Lloyd).

Trametes Muelleri Berk.

Peradeniya, July, 1908; No. 2733 (det. Lloyd). Peradeniya, December, 1911, No. 3302 (det. Lloyd). Both these were included under *Trametes lactinea* Berk., in Ann. Perad., VI., p. 140. I am unable to distinguish between these two species.

Dædalea tenuis Berk.

Peradeniya, August, 1912; No. 3554 (det. Lloyd). "A thin form of *Dædalea flavida*" (Lloyd).

Dædalea flavida Lev.

Lloyd adopts this name for the species listed in Ann. Perad., VI., p. 140, as *Trametes ochroleuca*.

Hydnaceæ.

Hydnum fragile n. sp.

Mesopodial, with a stalk up to 6 cm. high, 1·5 cm. diameter, expanding above into overlapping pilei; or forming rosettes up to 40 cm. diameter, arising from a central tubercular mass; white, becoming pale ochraceous. Pilei orbicular or flabelliform, up to 15 cm. broad, 6 cm. long, 4 mm. thick, horizontal or suberect, sometimes infundibuliform, brittle, obscurely concentrically zoned, surface rough with warts and ridges radially arranged; margin thick when fresh, minutely tomentose; flesh white, with translucent bands, not cartilaginous. Aculei short, about 1 mm. long, conical. Spores white, globose or oval, 3–5 × 3 μ. On the ground, Peradeniya, December, 1913, &c.; type, No. 3994 in Herb. Peradeniya.

Hydnum nigrescens n. sp.

Dimidiate, or resupinate with scattered dimidiate pilei. Pilei convex, up to 4 × 3 cm., orbicular, often laterally fused, stout, densely fasciculato-strigose, brownish-white, becoming brown or purple-brown ; spines up to 8 mm. long, terete, acute, rigid, cartilaginous, 0·4 mm. diameter, tapering regularly to the apex, cinereous, or purple-gray, becoming black when dry. In the resupinate patches the spines arise from a rather thick, spongy, strigose subiculum, which is at first brownish-white, then brown.

Hakgala, on decaying logs, fairly common ; type, No. 5110, Hakgala, April, 1917.

Thelephoraceæ.

Corticium hypochroum n. sp.

Effused, indeterminate, in oval patches about 3 × 1·5 cm., ashy with a purple tinge, in some states yellowish-green : sterile margin orange-red, with a narrow yellow edge. Surface even, compact, not waxy ; margin fimbriate. Total thickness up to 0·4 mm. ; basal layer half the total thickness, a loosely interwoven net of straight hyaline hyphæ, 2–4 μ diameter, with a few adherent crystals ; upper layer compact, densely filled at the base with red granules. Basidia clavate, 20–25 × 6–8 μ ; spores hyaline, broadly oval, 6–8 × 4–5 μ. Cystidia (gleocystidia) subcylindric, thin-walled, apex obtuse, 7 μ diameter, projecting 60 μ.

On the dead stem of some climbing plant, Hakgala, December, 1917 ; No 5525 in Herb. Peradeniya.

Corticium vagans B. & C.

On stems of *Solanum tuberosum* L., Diyanilla, April, 1918 ; No. 5675 in Herb. Peradeniya.

Kordyana Commelinæ n. sp.

Hypophyllous ; stromata minute, white, erumpent, about 0·1 mm. diameter, gregarious on pale green or white patches. Basidia clavate, 20 × 6 μ, two-spored ; spores clavate, hyaline, 7–8 × 3–4 μ. Conidiophores narrow-clavate, 50 μ long, 4 μ diameter above, 1·5 μ diameter below ; conidia (immature) globose, 2 μ diameter.

On leaves of *Commelina nudiflora* L., Haputale, November, 1917 ; No. 5684 in Herb. Peradeniya.

Porothelium reticulatum n. sp.

Livid brown when fresh, with a narrow white tomentose margin, widely effused, becoming pallid when dry. Cups close-set, subgelatinous when fresh, up to 0·2 mm. diameter, pruinose with white granules ; substratum white, very thin, floccose. Basidia clavate, four-spored. When dry, the fungus cracks into irregular reticulated lines of cups.

On dead wood, Hakgala, April, 1919 ; No. 5971 in Herb. Peradeniya. Peradeniya, No. 6098, August, 1919, &c. This species was Thwaites 488, which was not named by Berkeley and Broome. Iodine stains the basidial layer yellow, and the walls of the cups brown.

Cyphella flagellata n. sp.

White, obconic, up to 1 mm. high, 0·8 mm. diameter above, villous with upwardly-directed, rigid hairs. Hairs up to 0·1 mm. long, 4 μ diameter, verrucose or covered with short blunt processes, terminating abruptly in a thin flagellum.

On dead leaves, Hakgala, April, 1917 ; No. 5244 in Herb. Peradeniya.

Cyphella grisea n. sp.

Grayish-white, pruinose, 1·2 mm. diameter, 0·8 mm. high, campanulate, mouth directed downwards, substance subgelatinous, covered with minute tetrahedral or irregular crystals. and a few hyaline encrusted hyphæ. Basidia clavate, 15 × 6 μ. Spores globose, 4 μ diameter, with scattered spines up to 3 μ long.

On bark on living trees, Hakgala, December, 1917 ; No. 5509 in Herb. Peradeniya.

Dendrocyphella gen. nov.

Cups as in *Cyphella*, borne on long simple or branching stalks.

Dendrocyphella setosa n. sp.

Stalks up to 2 cm. high, 0·2 mm. diameter, simple or repeatedly branched, subulate, black, rigid, clothed with horizontally spreading setæ ; cups apical, nutant, campanulate, up to 1 mm. long, and 0·75 mm. diameter, when fresh

flesh-coloured, pale brown when dry, clothed with long, dark brown setæ and short hairs, which are scattered towards the base, but crowded towards the margin. Long setæ usually simple, tapering, acute, 0·1–0·5 mm. long, 6–12 μ diameter, slightly swollen at the base. Short hairs, 30–40 μ long, straight or curved, clavate, covered, especially in the upper part, with short, spreading, truncate spines. Margin of the cup composed of similar hyaline hairs. Basidia cylindric, 24 × 6 μ. Spores hyaline, narrow-oval, or pip-shaped, 5–6 × 2–2·5 μ.

On dead leaves of *Symplocos*, Hakgala, January, 1914, &c.; No. 4089 in Herb. Peradeniya.

Clavariaceæ.

Clavaria xylarioides n. sp.

Simple, clavate, up to 4 cm. high, 2 mm. diameter below, 4 mm. diameter above, terete, apex obtuse, violet-black, black at the base; internally purple-brown, with a violet-black outer zone. Basidia cylindrico-clavate, about 40 μ high, 8 μ diameter below, 12 μ diameter above, four-spored; sterigmata 10 μ high, conical to half the height, then hair-like. Spores broadly oval, 9–10 × 7 μ, or globose 8–9 μ diameter. Subhymenial layer violet by transmitted light.

On the ground, Peradeniya, December, 1914; No. 4389 in Herb. Peradeniya. Dewalakanda, August, 1919; No. 6096.

Clavaria rosolana n. sp.

Pale rosolane purple (Ridgway 69′d); up to 4 cm. high; base stout, up to 7 mm. diameter, short, soon dividing into stout branches which fork repeatedly; upper angles broad and rounded; tips short, obtuse. Spores white, smooth, spherical, 3–4 μ diameter, or oval, 4 × 3 μ.

On the ground, Waga, August, 1917; No. 5249 in Herb. Peradeniya.

Clavaria violacea n. sp.

Violet or amethyst, becoming brown when old; about 3 cm. high, stout, up to 2·5 mm. diameter below, twice or thrice branched, lower axils acute; tips usually once forked, with

short spreading points at a greater angle than the lower branches, points rather obtuse. Fasciculate, in clusters up to 3 cm. diameter.

On the ground, Henaratgoda, July, 1916 ; No. 4840 in Herb. Peradeniya.

Pistillaria actiniceps n. sp.

White, subtranslucent, up to 1·5 mm. high, 0·3 mm. diameter at the base, expanding upwards to 0·6 mm., sometimes slightly lobed above, covered everywhere, or sometimes only in the upper half, with upwardly-directed or radiating spicules. Spicules up to 200 μ long, hyaline, thick-walled, generally smooth, occasionally encrusted. Basidia clavate, 13 × 5 μ, two-spored ; sterigmata 8 μ high, 2 μ diameter below, conical to half their height, then linear, curved. Spores hyaline, globose or broadly oval, 8–12 μ diameter.

On dead stems of Bracken (*Pteris aquilina*) and *Rubus*, Hakgala, December, 1917 ; No. 5508 in Herb. Peradeniya.

Tremellaceæ.

Sirobasidium Brefeldianum A. Moll.

On a dead branch, Hakgala, December, 1917 ; No. 5510 in Herb. Peradeniya.

USTILAGINACEÆ.

Ustilaginoidea virens (Cooke) Tak.

On *Oryza sativa* Linn., Badulla, March, 1918 ; No. 5553 in Herb. Peradeniya.

UREDINACEÆ.

Uromyces Anotidis n. sp.

On *Anotis Richardiana* Hk. f., Hakgala, April, 1917.

Æcidia crowded, hypophyllous, covering the whole leaf, up to 0·25 mm. diameter, exoperidium white, well-developed, recurved. Exoperidial cells polygonal, 32–34 × 12–20 μ, verrucose with close-set ridges and warts. Æciospores oval or subglobose, contents orange, wall hyaline, minutely verrucose, 16–22 × 12–16 μ. Affected plants dwarfed, thickened, and etiolated.

Uredo sori hypophyllous, scattered, circular, 0·2 mm. diameter, cinnamon-brown. Uredospores oval or globose, yellow-brown, echinulate, 20–26 × 17–20 μ.

Teleutosori amphigenous, up to 0·4 mm. diameter, scattered, cinnamon-brown, compact, pulvinate. Teleutospores fusoid or obconoid, apex strongly thickened (up to 16 μ), truncate, strongly crested and incised, pale yellow-brown, almost hyaline, 30–36 × 16–22 μ ; pedicel up to 28 μ long.

Blastospora Hedyotidis n. sp.

On *Hedyotis Lessertiana* Arn., Hakgala, December, 1917 ; effete sori recorded as *Puccinia lateritia* B & C., in Ann. Perad., V., p. 231.

Sori hypophyllous, crowded, pulvinate, somewhat waxy, orange, becoming purple, up to 0·25 mm. diameter, on purple or blackish spots. Teleutospores hyaline, one-celled, oval, or slightly obclavate, 36–50 × 20 μ, with a stout thickened pedicel almost as broad as the spore ; producing at the apex a promycelium up to 80 μ long, 10 μ diameter.

? Puccinia Arenariæ (Schum.) Wint.

On *Cerastium indicum* W. & A., Hakgala, April, 1917.

Sori hypophyllous, pale brown, pulvinate, compact, up to 0·2 mm. diameter, confluent in patches up to 2 mm. diameter. Teleutospores pale yellow-brown, oblong, or oblong-oval, sometimes attenuated upwards, constricted at the septum, generally thin-walled, apex slightly thickened, 30 — 48 × 12–14 μ ; pedicel stout, hyaline, persistent, up to 40 μ long.

? Puccinia uralensis Transzch.

On *Senecio scandens* D. Don, Hakgala, April, 1917 ; one leaf only.

Sori hypophyllous, circular, 0·3–0·5 mm. diameter, compact, pulvinate, reddish-brown, blackening, clustered in a patch about 8 mm. diameter. Teleutospores oblong or clavate, apex truncate or wedge-shaped, the upper cell the broader, constricted at the septum, apex thickened (up to 8 μ), pale yellow-brown, 32–40 × 16–18 μ ; pedicel hyaline, tapering, 18–90 μ long, 4–9 μ diameter ; mesospores (only two seen), pyriform, 20–24 × 15–18 μ, pedicel 18 μ long.

Apparently differs from *Puccinia uralensis* in not being "epidermide diu tectis," nor black.

Puccinia Romagnoliana Maire & Sacc.

Uredo. On *Cyperus rotundus* L., Jaffna, March, 1917.

? Puccinia Duthiæ Ell. & Tracy.

Uredo. On *Andropogon pertusus* Willd., Peradeniya, April, 1917.

Uredospores globose, rather dark brown, minutely echinulate, 20–27 μ. Paraphyses short, clavate, hyaline.

Puccinia Nakanishikii Diet.

Uredo. On *Cymbopogon Martini* Stapf, Peradeniya, February, 1917.

Puccinia Isachnes Petch: *Uromyces Isachnes* Petch, Ann. Perad., VI., p. 209.

On *Isachne Kunthiana* W & A., Hakgala, April, 1917. Uredo, on *Isachne Gardneri* Benth., Hakgala, April, 1917.

Teleutosori hypophyllous, circular, black, minute. Teleutospores yellow-brown, darkening above, oblong-oval or clavate, constricted at the septum, apex moderately thickened and usually rounded, 34 — 44 × 18–24 μ; pedicel pale brown, up to 40 μ long, 5 μ diameter.

Phragmidium zeylanicum n. sp.

On *Rubus lasiocarpus* Sm., Hakgala, April, 1917.

Uredo sori amphigenous, scattered, minute, orange. Uredospores globose or oval, hyaline, echinulate, with rather long scattered spines, 20–28 × 19–24 μ. Paraphyses ovate, hyaline, thin-walled, up to 50 × 20 μ.

Teleutosori hypophyllous, circular, minute, scattered, black. Teleutospores fuliginous, thin-walled, epapillate, smooth, 4–9-septate, constricted at the septa, apical cell rounded or subconoid, basal cell elongated usually hyaline, attenuated below or sometimes narrow-cylindric, 70–140 × 26–30 μ; pedicel short, hyaline.

Hemileia Canthii B. & Br.

On *Canthium Rheedii* DC., Peradeniya, February, 1917.

Melampsora Helioscopiæ (Pers.) Cast.

Uredo. On *Euphorbia Rothiana* Spreng., Hakgala, April, 1919.

Uredo Hyperici-japonici n. sp.

On *Hypericum japonicum* Thunb., Hakgala, April, 1917.

Sori hypophyllous, circular, scattered, up to 0·4 mm. diameter, surrounded by the upturned epidermis. Spots red-brown, the whole leaf or plant becoming red-brown, Uredospores oval, 18–24 × 14–18 μ, or globose, 18–20 μ. thick-walled, yellow-brown, spinulose. Paraphyses hyaline, cylindric, almost equal, up to 40 × 6 μ.

Uredo Meliosmæ n. sp.

On *Meliosma Wightii* Planch., Hakgala, April, 1917.

Sori hypophyllous, scattered, minute, circular, pale brown. Uredospores oval, narrow-oval, or sub-pyriform, hyaline, strongly echinulate, 28–36 × 14–18 μ. Paraphyses hyaline, capitate, up to 50 μ high, 8 μ diameter below, 25 μ diameter above, or clavate, hooked at the apex ; apex thickened, pale yellow-brown.

Uredo Tephrosiæ Rabh.

On *Tephrosia purpurea* Pers., Jaffna, March, 1917.

Uredo Cassiæ-bicapsularis n. sp.

On *Cassia bicapsularis* L., Peradeniya, February, 1917, No. 5033 in Herb. Peradeniya.

Sori hypophyllous, circular or elongated, cinnamon, on irregular blackened areas, frequently along the veins. Uredospores oval or globose, yellow-brown, minutely echinulate, 14–18 × 8–14 μ.

Uredo Argyreiæ n. sp.

On *Argyreia tiliæfolia* Wight, Jaffna, March, 1917.

Sori hypophyllous, large, circular, up to 0·6 mm. diameter, or larger by confluence, dark brown, surrounded by the upturned epidermis. Uredospores rather dark brown, globose or elliptic, thick-walled, outer layer of wall hyaline, echinulate with short scattered hyaline spines, 28–40 × 28–32 μ.

Uredo Phyllanthi-reticulati n. sp.

On *Phyllanthus reticulatus* Poir., Jaffna, March 1917; No. 5023 in Herb. Peradeniya.

Sori hypophyllous, scattered, golden-brown, circular, up to 0·4 mm. diameter. Uredospores pale yellow-brown to hyaline, oval, thickwalled, echinulate, 20–24 × 12–18 μ. Paraphyses clavate, regularly expanding upwards, or abruptly inflated into an ovoid head, yellow or yellow-brown above, hyaline towards the base, apex strongly thickened, up to 60 μ long, 16 μ diameter above.

Uredo Cudraniæ n. sp.

On *Cudrania javanensis* Trec., Hakgala, April, 1917.

Sori hypophyllous, clustered, peritheciiform, up to 0·4 mm. diameter, on yellow spots. Uredospores oval or subglobose, almost hyaline, echinulate, 24–32 × 16–24 μ. Paraphyses short, subcylindric or slightly clavate, hyaline, up to 30 × 6 μ.

Uredo Boehmeriæ Diet.

On *Boehmeria platyphylla* Don, Haputale, November, 1917.

Uredo Marisci n. sp.

On *Mariscus Sieberianus* Nees, Poonagalla, November, 1917.

Sori hypophyllous, oval or oblong, up to 2 mm. long, 0·4 mm. broad, covered by the epidermis. Uredospores oval or pyriform, pale yellow-brown to hyaline, echinulate, 18–32 × 16–20 μ. Paraphyses straight, irregularly cylindric, slightly inflated or attenuated upwards, pale yellow-brown, up to 66 × 6 μ.

Uredo caricicola n. sp.

On *Carex Walkeri* Arn., Hakgala, April, 1917; on *Carex baccans* Nees, Haputale, June, 1917.

Uredo sori hypophyllous, oval, up to 0·3 mm. long, pale brown, for a long time covered by the epidermis. Uredospores pale yellow-brown to hyaline, oval, or pyriform, thickwalled, verrucose with scattered blunt spines, 18–30 × 13–16 μ.

Uredo Panici-villosi n. sp.

On *Panicum villosum* Lam., Hakgala, April, 1919.

Sori chiefly epiphyllous, circular, 0·2 mm. diameter, or oval, 0·5 × 0·2 mm., ferruginous, surrounded by the ruptured epidermis. Uredospores irregularly oval or globose, usually

thin-walled, pale yellow-brown, minutely spinulose, 24–34 × 18–24 μ ; germ pores, one, or two.

Uredo Anthistiriæ Petch.

On *Anthistiria gigantea* Cav., Peradeniya, February, 1917.

Uredo Ischæmi-ciliaris Petch.

Specimen, Waga, March, 1917, has almost hyaline, curved, irregularly clavate, or subcylindric paraphyses up to 50 × 12 μ.

Uredo Arundinariæ Syd.

On *Arundinaria japonica* Sieb. and Zucc., Peradeniya, February, 1919.

Uredo Dendrocalami n. sp.

On *Dendrocalamus strictus* Nees, Peradeniya, January, 1910; January, 1912.

Sori hypophyllous, minute, oval or circular, about 0·2 × 0·1 mm., pale ferruginous, situated in lines on pale brown, longitudinal streaks. Uredospores oval or pyriform, 26–35 × 19–22 μ, or globose, 18–28 μ diameter, contents yellow, wall hyaline, echinulate. Paraphyses curved, clavate, hyaline, thick-walled or almost solid, the lumen occupying one-half to two-thirds the length and situated nearer the concave side, 50–70 × 7–12 μ.

Uredo Lophatheri n. sp.

On *Lophatherum gracile* Brongn., Henaratgoda, January, 1919.

Sori amphigenous, usually oval, sometimes linear, pale brown, surrounded by the upturned epidermis, 0·4–0·8 × 0·2–0·3 mm. Uredospores oval, subglobose, or pyriform, pale yellow-brown to almost hyaline, thick-walled, strongly echinulate, 20–28 × 16–20 μ. Paraphyses not found.

Phycomycetæ.

Mucoraceæ.

Rhizopus nigricans Ehren.

On bread, Peradeniya, July, 1917 ; No 5257 in Herb. Peradeniya.

Pilobolus pullus Massee.

On cowdung, Hakgala, December, 1917 ; No. 5502 in Herb. Peradeniya.

Scattered ; total height 0·6–0·8 mm., clavate, expanding almost from the base, 0·3 mm. diameter above. Sporangia oval, black, 0·25 × 0·15–0·2 mm.; wall black-brown, smooth, not areolated. Spores oval, pale yellow, 8–10 × 5–6 μ.

Entomophthoraceæ.

Empusa Aulicæ Reich.

On larvæ of *Agrotis*, Peradeniya, January, 1918 (det. Thaxter).

Empusa papillata Thaxt.

On a dead fly, Peradeniya, December, 1914 ; No. 4358 in Herb. Peradeniya.

Metarrhizium Anisopliæ (Metsch.) Sorokin.

On a cricket, Hakgala, December, 1917 ; No. 5475 in Herb. Peradeniya.

Saprolegniaceæ.

Pythium Debaryanum Hesse.

On seedlings of *Alyssum* and *Silene*, Hakgala, January, 1918 ; Nos. 5452, 5453, in Herb. Peradeniya.

Peronosporaceæ.

Cystopus Portulacæ (DC.) Lev.

On *Portulaca quadrifida* L., Ambalangoda, August, 1917 ; No. 5463 in Herb. Peradeniya.

Phytophthora Colocasiæ Rac.

On *Colocasia* sp., Peradeniya, October, 1917 ; No. 5456 in Herb. Peradeniya.

Phytophthora Phaseoli Thaxt.

On Lima Bean, Peradeniya, Gangaruwa, September, 1917 ; No. 5459 in Herb. Peradeniya.

Phytophthora Nicotianæ Rac.

On tobacco seedlings, Teldeniya, April, 1919 ; No. 6114 in Herb. Peradeniya.

Phytophthora Meadii McRae.

On fruit, &c., of *Hevea brasiliensis*, Hunasgiriya, August, 1919 ; No. 6084 in Herb. Peradeniya.

Peronospora parasitica (Pers.) de Bary.

On *Brassica juncea* Hk. f. & Th.. Peradeniya, January, 1918 ; No. 5611 in Herb. Peradeniya.

Pyrenomycetæ.

Perisporiaceæ.

Eurotium repens de Bary.

On drying plants in the herbarium, Hakgala, April, 1917 : No. 5268 in Herb. Peradeniya. The usual species on herbarium specimens at Hakgala (5,600 ft.).

Eurotium orientale n. sp.

Perithecia lemon-yellow, globose, smooth, 120–180 μ diameter, in clusters on loose tufts, up to 0·5 mm. diameter, of radiating red or red-brown hyphæ. Hyphæ red-brown, hyaline at the tips, 4–6 μ diameter, clothed with long spines, or rough with incrustations in warts or granules. Asci eight-spored, ovate or globose, 12–15 μ diameter ; ascospores pale yellow, lenticular, circular in one aspect and 5–6 μ diameter, in the other ovoid, ends truncate and slightly incised, 5–6 × 3–4 μ. Conidia greenish-fuscous, strongly spinulose, spherical, 3–7 μ diameter, or oval, 6–7 × 5–4 μ, borne singly on short lateral pedicels on the red mycelium.

On drying plants in the herbarium, Peradeniya, August, 1906 ; No. 5518 in Herb. Peradeniya. The common species on drying plants at Peradeniya. Also on herbarium specimens from Burma ; No. 5519 in Herb. Peradeniya.

In some cases the mycelium exactly resembles that of *Myriococcum spinuligerum* Penz. & Sacc. From the descriptions, *Eurotium lateritium* var. *asperulum* differs in its verrucose ascospores, and *Eurotium rubrum* in the perithecia being ultimately red-brown.

Balladyna Butleri Syd.

On bamboo, 1910 ; No. 5731 in Herb. Peradeniya.

Zukalia Rubi n. sp.

Spots brownish-red, hypophyllous, sometimes extending over the whole under surface of the leaf ; mycelium hyaline, scanty. Perithecia scattered, globose, about 0·25 mm. diameter, black, bearing, especially towards the apex, simple, septate, brown, almost equal, obtuse appendages, up to 75 × 5 μ ; wall parenchymatous. Asci cylindrico-clavate with a short, often curved, foot, eight-spored, spores obliquely uniseriate, 60–66 × 10–12 μ. Spores hyaline, fusoid, three-septate, not constricted, 18–20 × 4 μ.

On leaves of *Rubus moluccanus* L., Hakgala, April, 1917 ; No. 5261 in Herb. Peradeniya.

? Zukaliopsis Heveæ n. sp.

Mycelium forming a superficial, separable, felted, rather dense covering over the whole upper surface on the leaf, blackish-brown to olivaceous, with a white shining margin ; basal hyphæ hyaline, regular, about 3 μ diameter, without hyphopodia, passing into branching chains of hyaline or fuscous moniliform cells, 6–10 × 5–6 μ. Perithecia 0·3 mm. diameter, flattened globose or discoid, depressed in the centre, black, minutely rugose, astomate, with a few hyaline radiating hyphæ at the base ; wall parenchymatous, cells not radial, circularly arranged round the apex, with a patch of small clavate cells which simulate periphyses. Asci clavate, attenuated below, eight-spored, 96–120 × 20–26 μ ; paraphyses linear. Spores hyaline, muriform, with four to nine transverse septa, and longitudinal septa in all but the terminal cells, or in only three of the upper, oblong oval, 22–30 × 8–9 μ, or ovato-fusoid, 32–48 × 14–18 μ, constricted at the septa, with a thick mucous coat.

On leaves of *Hevea brasiliensis* Muell.–Arg., Hewagam, October, 1918, &c.; No. 5798 in Herb. Peradeniya.

Sphæriaceæ.

Physalospora Cyperi n. sp.

Spots up to 2 mm. diameter, oval or circular, sometimes confluent : epidermis blistered and whitish. Perithecia immersed, crowded, black, up to 0·3 mm. diameter, with pale

brown mycelium in the adjacent cells ; wall pale brown by transmitted light. Asci cylindrico-clavate, eight-spored, spores biseriate, 140 × 16 μ ; paraphyses numerous, linear. Spores hyaline, narrow-oval, continuous, ends obtuse or subtruncate, 24–28 × 6–7 μ.

On leaves of *Cyperus arenarius* Retz, Colombo, December, 1917 ; No. 5649 in Herb. Peradeniya.

Trichosphæria sparsibarba n. sp.

Perithecia scattered or crowded, erumpent, almost superficial, subconoid, black, up to 0·4 mm. diameter, sparingly clothed with spreading setæ ; wall parenchymatous ; setæ up to 0·4 mm. long, 20 μ diameter below, slightly tapering, obtuse, septate, very thick-walled. Asci clavate, eight-spored, spores biseriate, 110–120 × 8–10 μ ; paraphyses linear. Spores hyaline, continuous, oblong-oval or subcymbiform, straight or curved, 16–22 × 5 μ.

On dead bamboo, Hakgala, April, 1917 ; No. 5341 in Herb. Peradeniya.

Desmotascus cocoes n. sp.

Stromata peritheciiform, immersed, sub-prominent, black, lenticular or globose, 0·25 mm. diameter, parenchymatous. Asci embedded in hyaline parenchymatous tissue, clavate, shortly pedicellate, eight-spored, spores biseriate, 80–90 × 20–22 μ. Spores hyaline, continuous, oval or cymbiform, ends rounded, 20–30 × 10–12 μ.

On leaves of *Cocos nucifera* L., Solomon Islands, June, 1917 ; No. 5231 in Herb. Peradeniya. Also Delwita, Ceylon, June, 1918.

Rosellinia albocincta n. sp.

Perithecia usually scattered, sometimes clustered, and occasionally fused in pairs, superficial, hemispherical, black, smooth, dull, about 1 mm. diameter, 0·6 mm. high, seated on a thin, white, effused film of mycelium ; ostiolum black, conical, sometimes surrounded by a paler area which may be depressed at the outer edge ; wall brittle, discontinuous over the base. Asci cylindric, spores obliquely uniseriate, sporiferous part 100 × 10 μ ; paraphyses filiform. Spores black-brown, oval, inequilateral, or broadly cymbiform, 10–16 × 6–8 μ.

On dead wood, Hakgala, December, 1917 ; No. 5579 in Herb. Peradeniya. There are examples of this in Thwaites's specimen of *Rosellinia rhypara* B. & Br., in Herb. Peradeniya (Thw. 555) ; the latter has larger spores, no white film, and a more globose perithecium.

Rosellinia Beccariana Ces.

On dead *Erythrina*, Wariapola, January, 1918 ; No. 5555 in Herb. Peradeniya.

Perithecia crowded, superficial, depressed globose, often distorted by mutual pressure, up to 4 mm. diameter, purple-black, with a broad darker area round the ostiolum, smooth, but cracking concentrically when dry ; wall carbonaceous, fragile ; ostiolum black, conical, obtuse, up to 0·5 mm. high, 0·7 mm. diameter at the base. Spores black-brown, lanceolate or narrow cymbiform, often inequilateral, 40–70 × 6–8 μ, the apices usually attenuated into a point 5 μ long.

The original description states that the perithecia are obversely pyriform.

Sordaria fimiseda Ces. & de Not.

On cowdung, Hakgala, December, 1917; No. 5504 in Herb. Peradeniya.

Sordaria communis Speg.

On cowdung, Hakgala, September, 1918 ; No. 5797 in Herb. Peradeniya, &c.

Sordaria citrina n. sp.

Superficial, scattered or clustered, conoid, about 1 mm. high, 0·6 mm. diameter, lemon-yellow, subtranslucent when fresh, densely clothed with short yellow hyphæ and attached to the substratum by yellow mycelium ; apex black, straight. Perithecial wall parenchymatous, yellow to brownish-yellow, blackening at the base and apex ; mass of immature asci and paraphyses yellow, Asci cylindric, tapering below, eight-spored, 190 × 16 μ ; paraphyses numerous, linear, slightly inflated at the apex, containing yellow granules. Immature spores cylindric, pale yellow, multiguttulate, 80 × 4 μ. Mature spores oval, acuminate at the apex, truncate at the base, black, 16–20 × 8–9 μ, with a basal

appendage, which soon disappears ; in some cases the immature spore has a thin appendage at each end, and the mature spore a short, thin, apical appendage.

On elephant dung, Hakgala, common ; type, No. 5481 in Herb. Peradeniya, December, 1917.

Sordaria pilosa n. sp.

Perithecia superficial, scattered, conoid, 0·5 mm. high, 0·3 mm. diameter, black, appearing gray when magnified, covered with rigid projecting hairs ; apex straight, papillate. Hairs straight, or curved at the tip, septate, pale purplish-brown, almost hyaline at the apex, equal, or inflated or attenuated above, 64–70 × 4 μ. Perithecial wall with a blackish-brown outer layer, hyaline internally, the outer layer exhibiting areolæ when mounted. Asci up to 250 × 15 μ, cylindrico-clavate, with a long tapering pedicel, eight-spored ; paraphyses diffluent. Immature spores cylindric, 60 × 5 μ. Mature spores oval, black, truncate at the base, 18–22 × 8–10 μ, with a hyaline basal appendage, sometimes with a short apical appendage, 6 μ long.

On elephant dung, Hakgala, January, 1918 ; No. 5503 in Herb. Peradeniya.

Sordaria byssiseda n. sp.

Perithecia scattered or clustered, ovate, apex straight, attached to the substratum by a dense weft of coarse purple-brown hyphæ, 5 μ diameter, in which the perithecia are sometimes partly embedded; perithecia covered in the upper part with rigid, spreading setæ, purple-brown, septate, attenuated upwards, regular, up to 90 μ long, 7 μ diameter below, 4 μ diameter at the apex. Asci cylindrico-clavate, 220 × 20 μ, eight-spored. Immature spores cylindric, 48 × 5 μ, with sometimes a thin appendage at each end. Mature spores black, oval, truncate at the base, 12–16 × 6 μ, with a stout basal appendage which sometimes terminates in a fine tail, and sometimes a thin apical appendage up to 10 μ long ; all appendages soon disappearing.

On dead wood, Hakgala, December, 1917 ; No. 5507 in Herb. Peradeniya.

Sphærella spinicola E. & E. ?

On prickles of cultivated Rose, Badulla, November, 1917 ; No. 5408 in Herb. Peradeniya.

Perithecia subepidermal, black, 0·2 mm. diameter, slightly prominent ; wall membranous, of large cells ; ostiolum large, 30 μ diameter, not elevated. Asci narrow-oval or clavate, shortly pedicellate or almost sessile, eight-spored, spores biseriate, 40–60 × 9 μ. Spores narrow-oval or fusoid, hyaline, one septate, constricted at the septum, with a stout mucilaginous outer coat, 14–17 × 5–7 μ.

Sphærella spinicola E. & E. was described as having continuous spores, 12–15 × 5–6 μ, and asci, p. spor., 45 × 12 μ. It is listed in Saccardo as *Læstadia*.

Sphærella citricola McAlp.

On *Citrus Limonum* Risso, Hakgala, April, 1917 : No. 5168 in Herb. Peradeniya.

Sphærella Erythrinæ Koord.

On leaves of *Erythrina lithosperma* Bl., Balangoda. November, 1918 ; No. 5820 in Herb. Peradeniya.

Sphærella Gastonis Sacc.

On leaves of *Cocos nucifera* L., Delwita, June, 1918 ; No. 5746 in Herb. Peradeniya.

Sphærella Mappiæ n. sp.

Spots pale brown, circular, up to 2 cm. diameter, often irregularly zoned. Perithecia hypophyllous, crowded, immersed, black, about 0·1 mm. diameter. Asci clavate, narrowed above, thick-walled, almost sessile, spores biseriate, 36–40 × 12–14 μ ; no paraphyses. Spores narrow-oval or fusoid, hyaline, one septate, 12–15 × 3·5–4 μ.

On leaves of *Mappia ovata* Miers, Hakgala, April, 1917 ; No. 5236 in Herb. Peradeniya.

Sphærella Vernoniæ n. sp.

Spots usually small, circular, red-brown, arid, 2–3 mm. diameter, becoming confluent and irregular. Perithecia immersed, visible on either side of the leaf, crowded in the centre of the spot, about 0·1 mm. diameter, ostiola not projecting. Asci ovate or oblong-ovate, eight-spored, spores

biseriate, 40-55 × 13–18 μ. Spores fusoid, ends obtuse, one septate, slightly constricted, the upper cell the broader and sometimes subacuminate, 13–16 × 6–9 μ.

On leaves of *Vernonia Hookeriana* Arn., Peradeniya, October, 1917 ; No. 5399 in Herb. Peradeniya.

Sphærella Senecionis n. sp.

Spots dark brown to black, arid. Perithecia epiphyllous, black, immersed, prominent. Asci broadly clavate or oval, shortly pedicellate, eight-spored, spores biseriate. Spores hyaline, narrow-oval or fusoid, ends obtuse, one septate, not constricted, 13–15 × 4 μ.

On leaves of *Senecio scandens* Don, Hakgala, April, 1917 ; No. 5262 in Herb. Peradeniya.

Sphærella Lobeliæ n. sp.

Spots irregularly oval, brownish-white, becoming membranous, translucent, surrounded by a brown zone and a narrow purple margin. Perithecia immersed, epiphyllous, scattered, up to 120 μ diameter, black. Asci clavate or narrow-oval, eight-spored, 40 × 8 μ, paraphyses absent. Spores cylindric, ends rounded, hyaline, one septate, not constricted, 11–15 × 3 μ.

On leaves of *Lobelia nicotianæfolia* Heyne, Haputale, November, 1917 ; No. 5625 in Herb. Peradeniya.

Bertia turbinata n. sp.

Perithecia superficial, clustered, black, ovate, 0·75 mm. diameter, collapsing and becoming turbinate, tuberculate with close-set elevations, wall thick. Asci clavate, long-pedicelled, spores biseriate, 160–170 × 16–18 μ, sporiferous part 80–100 μ long ; paraphyses numerous, linear. Spores subcylindric or narrow-oval, ends obtuse, straight or slightly curved, greenish-hyaline, one septate, not constricted, sometimes four guttulate, 20–30 × 6-7 μ.

On a dead branch, Peradeniya, January, 1917 ; No. 5302 in Herb. Peradeniya.

Bertia tessellata n. sp.

Perithecia superficial, globose or ovoid, up to 0·8 mm. diameter, black, rugose, usually with a smooth area round the papillate ostiolum ; wall when mounted areolated, consisting

of dense, more or less stellate masses united by thinner areas of parallel hyphæ 6 μ diameter. Asci narrow-clavate, eight-spored, spores biseriate, 125 × 10 μ; paraphyses numerous, filiform. Spores pale fuscous, fusoid, one then three septate, constricted at the median septum, median septum prominent, the other two indistinct, ends rounded, 24–30 × 4·5–5 μ.

On dead stems of *Amomum*, Hakgala, December, 1917; No. 5527 in Herb. Peradeniya.

Massarina biconica n. sp.

Perithecia immersed, scattered or occasionally confluent, globose, 0·25 mm. diameter, ostiola not projecting. Asci cylindrico-clavate, thick-walled, shortly pedicellate, spores obliquely uniseriate, 90 × 20 μ; paraphyses numerous. Spores greenish-hyaline, with a gelatinous outer coat, three septate, strongly constricted at the median septum, less strongly at the other two, biconoid, with ends acuminate, obtuse, or fusoid, 24–32 × 7–12 μ.

On dead branches of *Hevea brasiliensis* Muell.–Arg., Gangaruwa, February, 1917; No. 5006 in Herb. Peradeniya.

Leptosphæria Molleriana Alm. & de Cam.

On *Cocos nucifera* L., Delwita, June, 1918; No. 5750 in Herb. Peradeniya.

Ceratostomaceæ.

Lentomita ovalis n. sp.

Perithecia immersed, laterally oval, up to 0·4 mm. diameter, 0·25 mm. high; wall brown, membranous; ostiolum projecting, cylindric, more or less straight, black, up to 0·75 mm. long, 66 μ diameter, composed of parallel hyphæ. Asci clavate, eight-spored, spores biseriate, sporiferous part 34 × 6 μ. Spores narrow-oval, one septate, not constricted, hyaline, 8–10 × 2–3 μ. Paraphyses numerous.

On dead herbaceous stems, Hakgala, April, 1917; No. 5342 in Herb. Peradeniya.

Valsaceæ.

Eutypa conjuncta n. sp.

Stroma linear or circular, up to 1 mm. diameter and 0·4 mm. high, partly embedded in the wood, and elevating the bark, consisting of three or four confluent perithecia in the

linear, and up to eight in the circular forms ; a thin layer of mycelium underlies the bark and unites the groups of perithecia ; no definite black line in the wood. Perithecia 0·3–0·4 mm. diameter, usually angled by mutual pressure, vertically compressed. Ostiola projecting in clusters, slightly elevated above the bark, up to 0·6 mm. high, cylindric, slightly inflated at the apex. Mass of asci and spores fuscous. Asci clavate, attenuated into the tapering pedicel, eight-spored, spores biseriate, sporiferous part, 10–12 × 4 μ. Spores cylindric, curved, greenish-hyaline, 3–4 × 1·5 μ.

On branches of *Cedrela serrata* Royle, Haputale, November, 1917 ; No. 5512 in Herb. Peradeniya.

Peroneutypa variabilis n. sp.

Perithecia scattered or clustered, 0·4–0·5 mm. diameter, immersed in the wood, sometimes in groups of up to six ; ostiola projecting, solitary or in small groups, black, cylindric, 0·7–2·5 mm. high, 0·1–0·2 mm. diameter. Asci clavate, with a tapering pedicel, eight-spored, sporiferous part 12–18 × 3 μ. Spores greenish-hyaline, cylindric, curved, 3–5 × 1·5–2 μ.

On dead herbaceous stems, Peradeniya, February, 1918 ; No. 5517 in Herb. Peradeniya.

Melanconiella stellata n. sp.

Stromata scattered, immersed in the cortex, subconoid, 0·75 mm. diameter, composed of up to eight, thin-walled, loosely united perithecia, and crowned by a cylindric, parenchymatous column, 0·4 mm. diameter, which just projects above the bark and divides above into four or five wedge-shaped lobes. Perithecia up to 0·3 mm. diameter, angular ; stroma in horizontal section crenate, with one common ostiolum. A black line in the cortex above the stroma, extending laterally indefinitely ; no black line in the wood. Perithecial wall thin, pale brown or hyaline. Asci cylindric, shortly pedicellate, eight-spored, spores obliquely uniseriate, 100–110 × 10–12 μ ; paraphyses numerous. Spores oval or oblong-oval, one septate, not, or slightly, constricted, ends obtuse, brown, wall and septum thick, minutely verrucose, 10–15 × 5–6 μ.

On dead branch of *Camellia theifera* Dyer, Craig, January, 1918 ; No. 5472 in Herb. Peradeniya.

Thyridaria Pteridis n. sp.

Stromata immersed, oval in plan, up to 3 mm. long, 0·4 mm. broad, lenticular, 0·4 mm. high, raising the epidermis in elongated oval patches which split longitudinally, upper part consisting of loosely interwoven hyaline hyphæ with a black outer layer, the lower half consisting of the host tissues bounded by a black line. Perithecial cavities linearly arranged, depressed globose, 0·4 mm. diameter, 0·2 mm. high, with a distinct thin parenchymatous wall ; ostiola not projecting. Asci clavate, shortly pedicellate, thick-walled, eight-spored, spores biseriate. 150–170 × 24–30 μ ; paraphyses linear. Spores fuscous, cymbiform, slightly curved, usually five septate, occasionally six septate, constricted at the septa, one loculus usually inflated, with a stout, hyaline, gelatinous coat, 32–40 × 8–10 μ.

On stems of *Pteris aquilina* L., Hakgala, December, 1917 ; No. 5528 in Herb. Peradeniya.

Dothidaceæ.

Phyllachora Vanderystii Theiss. & Syd.

On leaves of *Panicum plicatum* Lamk., Poonagalla, November, 1917 ; No. 5690 in Herb. Peradeniya.

Phyllachora Winkleri Syd.

On *Paspalum scrobiculatum* L., Peradeniya, April, 1917 ; No. 5320 in Herb. Peradeniya.

Catacauma gracillimum (Speg.) Theiss. & Syd.

On *Fimbristylis monostachya* Hassk., Peradeniya, April, 1917 ; No. 5319 in Herb. Peradeniya.

Oligostroma Strychni n. sp.

Stromata hypophyllous, circular, about 1 mm. diameter, 160 μ thick, placentiform, elevated, papillate, immersed in the mesophyll and covered by the epidermis ; loculi oval or sub-globose, crowded, 66–90 × 50–66 μ. Asci clavate, four-, or eight-spored, spores biseriate, 48–60 × 7–13 μ ; no paraphyses. Spores greenish-hyaline, narrow-oval or fusoid, sometimes curved, ends obtuse, one septate, septum central or excentric, 18–24 × 4–5 μ.

On leaves of *Strychnos Benthami* Clarke, Hakgala, April, 1917 ; No. 5266 in Herb. Peradeniya.

Phæodothis Isachnes n. sp.

Stroma immersed, oblong-oval, 0·4–0·6 mm. diameter, dull black, visible on both sides of the leaf ; loculi up to six, depressed globose, up to 200 μ diameter ; ostiola prominent on the lower surface. Asci narrow-clavate, shortly pedicellate, eight-spored, spores biseriate, 80 × 9 μ ; paraphyses linear. Spores olive-brown, narrow-oval or oblong-oval, ends obtuse, one septate, constricted at the septum, the upper cell slightly the broader, 10–17 × 5–6 μ.

On leaves of *Isachne Kunthiana* W. & A., Haputale, November, 1917 ; No. 5884 in Herb. Peradeniya.

Homostegia Symploci Rac.

On *Symplocos elegans* Thw., Hakgala, April, 1917 ; No. 5232 in Herb. Peradeniya. On *Symplocos latiflora* Clarke, Hakgala, April, 1919 ; No. 6005 in Herb. Peradeniya.

Microthyriaceæ.

Seynesia Ipomææ Syd.

On *Ipomæa obscura* Ker, Badulla, November, 1917 ; No. 5681 in Herb. Peradeniya.

Calothyrium reticulatum n. sp.

Perithecia epiphyllous, scattered, black, scutate, 0·2 mm. diameter, even, merging into a thin membranous film, which forms large patches somewhat fuscous at the margin ; cover of perithecium obscurely radial, with a wide-meshed network of hyphæ in addition, opaque round the ostiolum, elsewhere blackish-brown ; ostiolum 16 μ diameter. Film hyaline, with a wide network of sparse, pale fuscous mycelium composed of flexuose, equal hyphæ, about 3 μ diameter, without hypho-podia. Asci broadly clavate, thick-walled, eight-spored, 40 × 10 μ ; no paraphyses. Spores greenish-hyaline, fusoid or narrow-oval, one-septate, 11–12 × 3·5–4 μ.

On *Aporosa lanceolata* Thw., Delgoda, March 24, 1919 ; No. 6158 in Herb. Peradeniya.

Micropeltella confluens n. sp.

Perithecia scattered, circular, up to 0·2 mm. diameter, scutate, dull black, confluent with a thin hyaline amorphous sheet which extends over almost the whole leaf : cover netted, black-brown, becoming yellow-brown towards the margin and merging into the hyaline sheet ; ostiolum circular, minute. Asci ovate, eight-spored, 25 × 12 μ ; paraphyses not seen. Spores subfusoid, ends rounded, hyaline, three septate, 9–12 × 3 μ.

On leaves of *Pavetta natalensis* Sond., Peradeniya, November, 1917 ; No. 5404 in Herb. Peradeniya.

Amazonia peregrina Syd.

Perithecia hypophyllous, scattered or clustered, superficial, circular, scutate, elevated in the centre, up to 0·6 mm. diameter, black ; cover membranous, not ostiolate, splitting radially, opaque in the centre, transparent fuscous towards the margin, composed of radial, branching hyphæ, 6 μ diameter separating at the margin into bundles of three or four, with interspaces partly filled by hyphopodia. Hyphopodia two-celled, terminal cell globose, up to 9 μ diameter, basal cell short. Asci clavate or ovoid, at first thick-walled, soon diffluent, two-spored, 60 × 20 μ. Paraphyses linear, diffluent. Spores black-brown, cylindric, or oblong-oval, ends rounded, four septate, deeply constricted, 36–40 × 16–18 μ. Free mycelium represented only by a narrow fringe round the perithecium.

On *Mæsa indica* A. DC., Hakgala, April, 1919 ; No. 5974 in Herb. Peradeniya.

DISCOMYCETÆ.

Phæoglossum, gen. nov. *Geoglossaceæ.*

Clava stalked, expanding above into an ovoid or sub-hemispherical head, which bears a continuous palisade layer of asci and paraphyses. Asci furnished with a pore. Spores continuous, oval, fuscous.

Phæoglossum zeylanicum n. sp.

Stalk up to 1 cm. high, 0·15 mm. diameter, simple, occasionally forked, smooth, shining, black, white internally. Head ovoid or sub-hemispherical, merging gradually into the

stalk or truncate at the base, black, smooth, 0·35–0·4 mm. high, 0·2–0·4 mm. diameter, white internally, with an outer layer of asci and paraphyses about 65 μ deep, which is fuscous in section. Asci cylindric, shortly pedicellate, furnished with an apical pore, eight-spored, spores obliquely uniseriate, about 40 × 4 μ. Spores oblong-oval, ends rounded, greenish-olivaceous in mass, fuscous, 7–9 × 3–4 μ. Extruded spores adhere to the head. Paraphyses linear, hyaline, pale olivaceous in mass, fused above into a continuous layer.

Conidial stage stilboid, white ; stalk 0·4 mm. high, 0·05 mm. diameter ; head sub-globose, 0·15 mm. diameter. Conidia hyaline, oval, sometimes slightly pointed at one end, 7–9 × 3–4 μ.

On decaying *Loranthus* fruits, Hakgala, May, 1912 ; No. 3632 in Herb. Peradeniya.

Elsinoe Canavaliæ Rac.

On *Canavalia ensiformis* DC., Peradeniya, May, 1918 ; No. 5696 in Herb. Peradeniya.

Deuteromycetæ.

Sphæropsidaceæ.

Phyllosticta Mayilæ n. sp.

Spots irregular, red-brown, usually extending from the margin of the leaf. Pycnidia epiphyllous, immersed, black, membranous, 80–100 μ diameter ; ostiolum about 10 μ diameter. Spores hyaline, continuous, broadly oval, 8–11 × 4–6 μ.

On leaves of *Bauhinia* sp. (indet.), Peradeniya, August, 1917 ; No. 5335 in Herb. Peradeniya.

Phyllosticta disciformis Penz.

On leaves of *Citrus Aurantium* L. var. *vulgaris* Risso, Hakgala, April, 1917 ; No. 5111. On leaves of *Citrus decumana* Willd., Hakgala, April, 1917 ; No. 5113 in Herb. Peradeniya.

Phyllosticta Physaleos Sacc.

On leaves of *Physalis peruviana* L., Hakgala, April, 1917 ; No. 5157 in Herb. Peradeniya.

Phyllosticta Usteri Speg.

On leaves of *Coffea robusta* Chev., Panadure, December, 1918 ; No. 5822 in Herb. Peradeniya.

Phoma Durionis n. sp.

Pycnidia subepidermal, slightly prominent, scattered, black, about 200 μ diameter, outline somewhat irregular ; wall blackish-brown, black at the margin ; ostiolum large, circular, 40 μ diameter, not projecting. Spores fusoid or narrow-oval, ends acute, 7–10 × 1·5–2 μ, extruded in a thick white tendril ; basidia short, simple, slender, up to 16 μ long.

On fruits of *Durio zibethinus* L., Peradeniya, August, 1918 ; No. 5784 in Herb. Peradeniya.

Phoma Justiciæ n. sp.

Spots white, circular, up to 2 mm. diameter, with a raised purple margin. Pycnidia immersed, epiphyllous, 100–120 μ diameter, ostiola not projecting. Spores hyaline, continuous, oval or oblong oval, 3–4 × 1·5 μ.

On leaves of *Justicia Betonica* L., Peradeniya, February, 1917 ; No. 5045 in Herb. Peradeniya.

Phoma aterrima n. sp.

Pycnidia immersed, prominent, crowded, black, about 0·5 mm. diameter ; ostiolum 20 μ diameter. Spores oblong-oval, ends obtuse, sometimes two-guttulate, 6–9 × 1·5 μ, extruded in a white tendril.

On fruits of *Hevea brasiliensis* Muell.–Arg., in the laboratory, Peradeniya ; No. 4816 in Herb. Peradeniya.

Phomopsis Phaseoli n. sp.

Pycnidia immersed, scattered, black, thin-walled, lenticular, 0·25 mm. diameter. Spores hyaline, narrow-oval or oblong-oval, 3–6 × 1·5–2 μ, or linear, uncinate, 14–16 μ long.

On dead stems of seedling *Phaseolus Max* L., Peradeniya, July, 1918 ; No. 5765 in Herb. Peradeniya.

Phomopsis Cocoes n. sp.

Pycnidia black, immersed, irregularly oval or linear, incompletely chambered. Spores hyaline, narrow-oval, ends subacute, 7–9 × 2–2·5 μ, or linear, curved or uncinate, tapering to the curved end, 18–25 × 1 μ.

On decaying coconut fruits, Kurunegala, July, 1917 ; No. 5254 in Herb. Peradeniya.

Macrophoma Mantegazziana (Penz.) Berl. & Vogl.

On leaves of *Citrus Aurantium* var *vulgaris* Risso, Hakgala, April, 1917 ; No. 5111 in Herb. Peradeniya.

Pyrenochæta nipponica Hara.

On leaves of *Oryza sativa* L., Kelaniya, September, 1919 ; No. 6144 in Herb. Peradeniya.

Vermicularia Dematium (Pers.) Fr.

On seedling *Hevea* stems, Bollagalla, November, 1905 ; No. 2225. On dead stems of *Crotalaria Saltiana* Andr., Ratnapura, October, 1908 ; No. 2665. On dead stems of *Ricinus communis* L., Peradeniya, November, 1913 ; No. 3905. On *Coffea arabica* L., attacked by *Hemileia*, Peradeniya, January, 1912 ; No. 3290 in Herb. Peradeniya.

Vermicularia Capsici Syd.

On fruits of *Capsicum* (cult.), Anuradhapura, April, 1917 ; No. 5315. On fruits of *Lycopersicum esculentum* Mill., Peradeniya, January, 1918 ; No. 5464 in Herb. Peradeniya.

Cytosporella discoidea n. sp.

Stroma circular, about 0·8 mm. diameter, erumpent, black, flattened, surface irregular, about 0·2 mm. thick. Pycnidia totally immersed or slightly projecting, crowded, opening separately. Basidia up to 30 μ long, branched ; spores hyaline, narrow-oval or subcylindric, ends rounded, 3–4 × 1 μ.

On dead twigs of *Hevea brasiliensis* Muell.–Arg., Gangaruwa, February, 1917 ; No. 5075 in Herb. Peradeniya.

Cytospora palmicola B. & C.

On fruits of *Cocos nucifera* L., Kurunegala, July, 1917 ; No. 5250 in Herb. Peradeniya.

Ascochyta Lobeliæ n. sp.

Spots irregularly oval or circular, brownish-white, dry, often confluent, sometimes splitting, with a broad purple margin. Pycnidia epiphyllous, scattered, circular, up to 120 μ diameter, or oval, 120 × 180 μ ; wall membranous. Spores narrow-oval or sub-fusoid, one septate, constricted at the septum, hyaline, 11–15 × 4 μ, occasionally 20 × 6 μ.

On leaves of *Lobelia nicotianæfolia* Heyne, Nuwara Eliya, December, 1917 ; No. 5624 in Herb. Peradeniya.

Ascochyta Cyphomandræ n. sp.

Spots subcircular, up to 2 cm. diameter, black becoming gray, often concentrically ridged, the centre cracking and falling out. Pycnidia immersed, scattered, epiphyllous, 0·3 mm. diameter, black, brown by transmitted light, ostiolate. Spores oblong, ends rounded, hyaline, one septate, sometimes slightly constricted, 8–10 × 3–3·5 μ.

On leaves of *Cyphomandra betacea* Send., Hakgala, April, 1917 ; No. 5165 in Herb. Peradeniya.

Hendersonia obesa n. sp.

Spots circular, gray or brownish-gray, with a broad reddish-brown margin, becoming confluent. Pycnidia immersed, scattered, epiphyllous, pale brown, black round the ostiolum, 180 μ diameter ; wall parenchymatous ; ostiolum 30 μ diameter. Spores ovate or oblong-oval, three to four septate, usually constricted at the septa, sometimes deeply constricted at the median septum, fuscous, 32–42 × 18–26 μ ; basidia short, stout.

On leaves of *Erythrina velutina* Willd., Peradeniya, August, 1917 ; No. 5829 in Herb. Peradeniya.

Hendersonia rosicola n. sp.

Pycnidia immersed, not erumpent, scattered, black, about 0·25 mm. diameter, ostiolum projecting. Spores narrow-oval, fuliginous, two to four septate, not constricted, 17–22 × 6–8 μ.

On twigs of cultivated rose, Badulla, November, 1917 ; No. 5408 in Herb. Peradeniya.

Hendersonia Heveæ n. sp.

Pycnidia subepidermal, elevating and cracking the epidermis, lenticular, black, up to 250 μ diameter ; wall parenchymatous ; ostiolum 30 μ diameter, not elevated. Spores oblong or subfusoid, ends rounded, straight or slightly curved, three or four septate, not constricted, fuscous, 18–36 × 6–8 μ.

On stems and fruits of *Hevea brasiliensis* Muell.-Arg., forming a pseudostroma on the fruits, Edurugalla, June, 1918 ; No. 5745 in Herb. Peradeniya.

Septoria graminum Desm.

On *Poa annua* L., Hakgala, April, 1917 ; No. 5161 in Herb. Peradeniya.

Leptostromataceæ.

Asterostomella Aberiæ n. sp.

Chiefly epiphyllous. Mycelium superficial, stout, 5 μ diameter, regular, not constricted ; hyphopodia one septate, straight or curved, up to 16 μ long, with a basal cell 5 μ broad, 3 μ high, and an ovoid or cylindric apical cell about 8 μ diameter, attenuated towards the tip. Pycnidia scutate, cover radial, splitting radially and disappearing, except at the margin, fuscous, 55–70 μ diameter. Spores pyriform, or more usually turbinate, rounded above, contracted shortly below the apex with well-defined angles and tapering to the base, obtuse or acute at the base, black-brown, with a transverse hyaline band, 14–17 × 9–10 μ .

On *Aberia Gardneri* Clos., Peradeniya, June, 1919 ; No. 6002 in Herb. Peradeniya.

Excipulaceæ.

Phæodiscula Cudraniæ n. sp.

Spots yellow. Pycnidia epiphyllous, clustered, subepidermal, flat, circular, up to 2·5 mm. diameter, 60 μ thick, upper and lower layers black ; upper layer splitting off. Basidia short, 12 μ long ; spores pale fuliginous, oval or oblong-oval, ends rounded, 3–5 × 2–2·5 μ.

On leaves of *Cudrania javanensis* Trec., Hakgala, April 1917 ; No. 5081 in Herb. Peradeniya. Perhaps identical with *Hymenopsis Cudraniæ* Massee (not seen).

Melanconiaceae.

Glœosporium Holstii P. Henn.

On leaves of *Tabernæmontana dichotoma* Roxb., Peradeniya, June, 1918 ; No. 5883 in Herb. Peradeniya.

Glœosporium Litseæ n. sp.

Spots circular, brownish-gray, about 1·5 cm, diameter. Acervuli hypophyllous, erumpent, scattered, pale brown,

subtranslucent, 0·15 mm. diameter. Conidia narrow-oval or subcylindric, 5–8 × 2 μ; conidiophores simple, short, up to 16 μ long.

On leaves of *Litsea* sp., Hakgala, April, 1919; No. 5994 in Herb. Peradeniya.

Glœosporium phomoides Sacc.

On fruits of *Lycopersicum esculentum* Mill., Colombo, November, 1917; No. 5415 in Herb. Peradeniya.

Glœosporium Impatientis n. sp.

Acervuli amber-coloured, up to 0·3 mm. diameter; conidia cylindric, ends rounded, 14–18 × 3·5–4·5 μ.

Causing a soft rot on stems of cultivated *Impatiens Balsamina* L., Madola, September, 1919; No. 6121 in Herb. Peradeniya.

Glœosporium cocophilum Wakef.

On coconut fruits, Kurunegala, July, 1917; No. 5252 in Herb. Peradeniya.

Glœosporium cryptum n. sp.

Acervuli subepidermal, raising the epidermis in oval pulvinate elevations, up to 0·6 × 0·3 mm., epidermis ultimately splitting; acervuli often confluent. Conidia cylindric or narrow-oval, ends obtuse, 18–25 × 4–5 μ.

On decaying fruits of *Cocos nucifera* L., Kurunegala, April 1917; No. 5255 in Herb. Peradeniya.

Colletotrichum Lindemuthianum (Sacc. & Magnus) Briosi & Cav.

On *Phaseolus* sp. (cult.), Nuwara Eliya, June 30, 1919; No. 6018 in Herb. Peradeniya.

Colletotrichum Erythrinæ Koord.

On leaves of *Erythrina lithosperma* Bl., Balangoda, November, 1918; No. 5819 in Herb. Peradeniya.

Colletotrichum glœosporoides Penz.

On leaves and shoots of *Citrus decumana* Willd., Hakgala, April, 1917; No. 5162 in Herb. Peradeniya.

Colletotrichum paucisetum n. sp.

Acervuli white, circular, up to 0·3 mm. diameter; conidia hyaline, cylindric, ends rounded, 13–16 × 4–5 μ: setæ scanty, black-brown, septate, tapering upwards, obtuse, 48–64 × 5 μ.

On decaying fruits of *Cocos nucifera* L., Kurunegala, July, 1917; No. 5256 in Herb. Peradeniya.

Septoglœum Dumasiæ n. sp.

Spots brownish, indefinite, Acervuli hypophyllous, gregarious, pale or dark brown, pulvinate, translucent, up to 0·2 mm. diameter, surrounded by the ruptured epidermis. Spores cylindric, apex rounded, base subacute, hyaline, up to four septate, 18–32 × 2·5–3 μ.

On leaves of *Dumasia villosa* DC., Hakgala, April, 1919; No. 5982 in Herb. Peradeniya.

Pestalozzia Mangiferæ P. Henn.

On leaves of *Mangifera indica* L., Peradeniya, October, 1919; No. 6128 in Herb. Peradeniya.

Mucedinaceæ.

Oidium.

On *Urena lobata* L., Haputale, June, 1917.

On *Cassia mimosoides* L., Diyanilla, September, 1918.

On *Passiflora stipulata* Aubl., Haputale, November, 1917.

On *Sechium edule* Sw., Hakgala, April, 1919.

On *Coriandrum sativum* L., Harasbedde, July, 1918.

On *Peucedanum graveolens* B. & H., Peradeniya, August, 1919.

On *Lycopersicum esculentum* Mill., Diyanilla, September, 1918.

On *Solanum ciliatum* Lam., Peradeniya, September, 1917.

On *Cyphomandra betacea* Send., Hakgala, April, 1919.

On *Stachytarpheta indica* Vahl, Higgoda, February, 1918.

On *Euphorbia Rothiana* Spr., Bandarawela, August, 1916.

On *Acalypha indica* L., Peradeniya, December, 1918.

On *Phyllanthus Niruri* L., Peradeniya, December, 1918.

On *Mirabilis Jalapa* L., Peradeniya, August, 1919.

Acremonium roseum n. sp.

Tufts circular or elongated, arising from cracks in the bark, up to 2 mm. diameter, pink, lax, composed of erect or suberect simple conidiophores; conidiophores hyaline, septate, up to 0·5 mm. long, 8–10 μ diameter, sometimes inflated below the septa, not inflated at the apex; conidia apical, solitary, oval, subacuminate, base truncate, thick-walled, wall hyaline, contents pinkish, 32–42 × 16–20 μ.

On dead branches, Peradeniya, January, 1918; No. 5523 in Herb. Peradeniya.

The apex of the condiophore is not toothed, the conidium being attached over the whole breadth. The conidia grow out from the apex, leaving a distinct collar, and the upper segments of the conidiophore are surrounded by a collar at their bases. Sometimes the conidium does not become detached, but grows on at the apex as a conidiophore, leaving the conidium intercalary.

Ovularia Veronicæ (Fuck.) Sacc.

On *Veronica polita* Fr., Hakgala, April, 1917; No. 5076 in Herb. Peradeniya.

Verticillium niveum n. sp.

Repent hyphæ hyaline, slender. Conidiophores up to 75 μ high, 2·5 μ diameter below, attenuated upwards; lateral branches whorled, 8–12 μ long; conidia in globose heads up to 16 μ diameter, hyaline, continuous, narrow-oval or subcylindric, 5–7 × 1·5–2 μ.

Forming extensive patches on the under surface of the leaf of *Adenostemma viscosum* Forst., Hakgala, April, 1917; No. 5229 in Herb. Peradeniya.

Trichothecium parasiticum n. sp.

Tufts circular, up to 0·5 mm. diameter, pink with a white margin, lax; conidiophores usually short, simple, flexuose above; conidia terminal, hyaline, narrow-oval or fusoid, minutely warted, ultimately one-septate, 8–16 × 3–5 μ.

On *Uredo* sori of *Melampsora epitea* Thuem., on *Salix tetrasperma* Roxb., Hakgala, April, 1917; No. 5228 in Herb. Peradeniya.

Monacrosporium ovatum n. sp.

Mycelium about 5 μ diameter, hyaline : conidiophores erect, simple, septate, attenuated upwards, up to 16 μ long ; conidia apical, solitary, hyaline, ovato-fusoid, attenuated below, apex obtuse, subacuminate, finally three-septate, with two septa towards the base and one near the apex, 26–36 × 12–16 μ.

On decaying leaf base of *Cocos nucifera* L., Kurunegala, September, 1917 ; No. 5373 in Herb. Peradeniya.

Dematiaceæ.

Trichocladium olivaceum n. sp.

Tufts purple-black, scattered, circular, 0·5–1 mm. diameter, pulverulent. Hyphæ pale yellowish-olive, 4 μ diameter, regular, branched, lax, thin-walled, strongly encrusted. Conidia terminal, catenulate, black-brown, oblong-oval or cylindric, ends rounded, strongly warted, one-septate, constricted at the septum, 16–18 × 9–12 μ ; a few one-celled, spherical, 10 μ diameter.

On decaying leaves of *Furcræa gigantea* Vent., Hakgala, December, 1917 ; No. 5626 in Herb. Peradeniya.

Septonema exaltatum n. sp.

Forming black patches. Conidiophores equal, septate, purple-brown, 30–90 μ high, 6 μ diameter ; conidia catenulate, blackish-brown, fusoid or cylindric, apex rounded or truncate, 3 to 7 septate, not constricted, 26–36 × 6 μ.

On dead branches of *Hevea brasiliensis* Muell.-Arg., Peradeniya, February, 1917 ; No. 5005 in Herb. Peradeniya.

Septonema hormiscioides n. sp.

Forming effused, black, velvety patches. Repent hyphæ brown, 3 μ diameter. Conidiophores almost absent ; conidia forming branching chains up to 90 μ high. Conidia usually 3 septate, occasionally 2 septate, oval or cylindric, ends rounded, dark brown or blackish-brown, constricted at the septa, 12–16 × 4–5 μ ; some one-celled, oval 5–6 × 3–4 μ.

On dead herbaceous stems, Hakgala, April, 1917 ; No. 5343 in Herb. Peradeniya.

Heterosporium Wikstrœmiæ n. sp.

Tufts large, hypophyllous, clustered, in large blackish-olivaceous patches, causing yellow or yellowish-green spots on the upper surface of the leaf coinciding with the area covered by the fungus on the lower. Conidiophores fasciculate, geniculate, up to 200 μ high, 4 μ diameter, septate, olivaceous. Conidia cylindric, equal or slightly attenuated upwards, ends obtuse, straight or irregularly bent, 4–9 septate, closely septate, olivaceous, verrucose, 30–58 × 4–5 μ.

On leaves of *Wikstrœmia viridiflora* Meisn., Peradeniya, February, 1919 ; No. 5878 in Herb. Peradeniya.

Helminthosporium turcicum Pass.

On *Zea Mais* L., Diyanila Kaele, October, 1919.

Helminthosporium extensum n. sp.

Forming black patches, several inches long. Conidiophores up to 1·5 mm. high, 5 μ diameter, regular, sometimes nodulose towards the apex, sometimes forked above. Conidia clavate, ends obtuse, attenuated below, outline somewhat irregular, not constricted, 4 to 12 septate, pale fuliginous, 40–84 × 8–9 μ.

On dead stems of *Erythrina lithosperma* Bl., Talawakele, July, 1917 ; No. 5243 in Herb. Peradeniya.

Helminthosporium ampullaceum n. sp.

Conidiophores scattered, or in groups of two or three, up to 0·5 mm. high, 12 μ diameter, equal, septate, black-brown to yellow-brown, with pulvinate spore attachments towards the apex. Conidia acrogenous, obclavate, 80–116 × 22–26 μ, attenuated in the upper third to 5 μ diameter, 6 to 9 septate, not constricted, yellow-brown, paler towards the apex, wall and septa thin, apex clothed with a translucent mass about 3 μ thick for a length of about 20 μ ; base of the spore and apex of the conidiophore strongly thickened and opaque, the basal cell of the spore becoming hyaline in glycerine.

On dead wood, Hakgala, April, 1917 ; No. 5344 in Herb. Peradeniya.

Macrosporium Macalpineanum Sacc. & Syd.

On leaves of cultivated Pelargonium, Bandarawela, November, 1918 ; No. 5815 in Herb. Peradeniya.

Cercospora cruenta Sacc.

On *Phaseolus* sp., Nuwara Eliya, June, 1919 ; No. 6019 in Herb. Peradeniya.

Cercospora Hibisci Tracy & Earle.

On leaves of *Hibiscus esculentus* L., Puwakpitiya, May, 1918 ; No. 5715 in Herb. Peradeniya.

Cercospora Cordobensis Speg.

On *Argyreia populifolia* Chois., Haputale, November, 1917 ; No. 5688 in Herb. Peradeniya.

Cercospora rosicola Pass.

On cultivated rose, Colombo, August, 1917 ; No. 5273 in Herb. Peradeniya.

Cercospora Henningsii Allesch.

On leaves of *Manihot utilissima* Pohl, Peradeniya, June, 1918 ; No. 5879 in Herb. Peradeniya.

Cercospora Musæ Zimm.

On *Musa paradisiaca* L., Peradeniya, July, 1919 ; No. 6071 in Herb. Peradeniya.

Cercospora Woodfordiæ n. sp.

Spots small, circular, up to 2 mm. diameter, white with a purple margin on the upper surface, olivaceous below. Acervuli epiphyllous, black, 80–100 μ diameter ; conidiophores crowded, almost regular, fuscous, 66 μ long, 3 μ diameter ; conidia cylindric, ends obtuse, multiseptate, pale olivaceous or almost hyaline, 60–70 × 3 μ.

On leaves of *Woodfordia floribunda* Sal., Peradeniya, January, 1918 ; No. 5757 in Herb. Peradeniya.

Stilbaceæ.

Stilbum luteocinctum n. sp.

Synnemata up to 0·5 mm. high ; stalk dark brown, about 120 μ diameter ; head dark brown to blackish, flattened globose, 250 μ diameter ; arising from a conical, or pulvinate, loose, irregularly nodular, lemon-yellow basal mass, up to 0·5 mm. diameter, of interwoven hyphæ and crystals. Conidiophores simple, clavate. Conidia obovate, continuous, pale yellow, thick-walled, 8–12 × 5–6 μ.

On dead wood, Peradeniya, October, 1919 ; No. 6125 in Herb. Peradeniya.

? Stilbum Durionis n. sp.

Synnemata up to 0·6 mm. high, 0·2 mm. diameter, columnar, inflated at the apex, yellowish, translucent, gelatinous; stalk short, the upper part of the column consisting of a mass of conidia; conidiophores slender, conidia terminal. Conidia at first fusoid, truncate below, rounded above, becoming subcylindric, hyaline, continuous, 8–20 × 3–4 μ.

On decaying fruits of *Durio zibethinus* L., Peradeniya, August, 1918; No. 5785 in Herb. Peradeniya.

Didymostilbe Coffeæ P. Henn.

On twigs of *Camellia theifera* Dyer, Katandola, August, 1917; No. 5339 in Herb. Peradeniya.

Helicostilbe simplex n. sp.

Hypophyllous. Synnemata scattered, up to 0·8 mm. high, 30 μ diameter, black, equal, slightly bulbous at the base, each arising from a small attachment disc of coalescent hyphæ; stalk villous with short free hyphal tips, and terminating at the apex in very short free conidiophores. Conidia apical, solitary, fuliginous, straight or slightly curved, 3 to 4 septate, uncinate, the longer arm 14–20 × 4 μ, the shorter 7–8 × 4 μ and closely applied to the longer.

On the under surface of living leaves of *Daphniphyllum glaucescens* Bl., Hakgala, April, 1917; No. 5263 in Herb. Peradeniya.

Tuberculariaceæ.

Tubercularia Cansjeræ n. sp.

Spots circular, up to 1 cm. diameter, yellowish-white, becoming membranous and translucent, with a narrow, thickened margin. Sporodochia hypophyllous, circular, pulvinate, moderately compact, up to 0·4 mm. diameter, clustered, brownish-pink; conidiophores short, up to 25 μ high, 2–3 μ diameter, branched dichotomously, rather lax, not forming a compact basal tissue; conidia narrow-oval, continuous, hyaline, ends obtuse, 3–5 × 1·5–2 μ.

On leaves of *Cansjera Rheedii* Gmel., with an immature Pyrenomycete (? *Physalospora*), Henaratgoda, January, 1919; No. 6150 in Herb. Peradeniya.

Tuberculariа nigro-maculans n. sp.

Spots small, circular, 2–3 mm. diameter, depressed, upper surface black surrounded by a yellow-green zone, lower surface black with a gray centre. Sporodochia amphigenous, chiefly hypophyllous, minute, erumpent, crowded in clusters up to 0·4 mm. diameter, pale pinkish, parenchymatous below. Conidia oval, hyaline, 4–5 × 2–2·5 μ ; basidia simple, fusoid, 8 × 3 μ.

On leaves of *Ficus Tsjakela* Burm., which it defoliates, Peradeniya, April, 1918 ; No. 5692 in Herb. Peradeniya.

Tuberculina viridis n. sp.

Acervuli black, pulvinate ; conidia spherical, blackish-green with a large central gutta, 14–18 μ diameter.

On a *Puccinia* on *Ischæmum ciliare* Retz, Hakgala, April. 1917 ; No. 5267 in Herb. Peradeniya.

Epidochium Xylariæ v. Hohnel var. **microspora.**

Acervuli hemispherical, about 0·2 mm. diameter, black, with a white covering of spores ; centre parenchymatous over a small area, the greater part of the stroma composed of radial, stout, branching, compactly arranged, fuscous hyphæ. Conidiophores fuscous, 4 μ diameter, slightly inflated at the apex or sometimes lobed. Conidia acrogenous, hyaline, narrow-oval, ends acute, 4–6 × 1·5–2 μ.

On a *Xylaria*, Hakgala, April, 1919 ; No. 5950 in Herb. Peradeniya.

Cerebella Andropogonis Ces.

On *Andropogon pertusus* Willd., Peradeniya, April, 1917 ; No. 5317 in Herb. Peradeniya.

Cerebella Sorghi Tracy & Earle.

On *Sorghum vulgare* Pers., Harasbedda, April, 1919 ; No. 5975 in Herb. Peradeniya.

Cerebella Cynodontis Syd.

Stromata ovoid, up to 2 mm. long, 1·5 mm. diameter, cerebriform, black. Conidia in permanent clusters usually of four, 12–16 μ diameter ; individual conidia blackish-olive, almost smooth, 8–10 μ diameter.

On the inflorescence of *Cynodon Dactylon* Pers., Anuradhapura, December, 1919 ; No. 6156 in Herb. Peradeniya.

Interim Notes on Entomogenous Fungi.

BY

T. PETCH, B.A., B.Sc.

IN continuation of previous communications on the fungi parasitic on scale insects, a paper on the species of *Torrubiella* on those hosts has been completed, and will be published as soon as circumstances permit. The following undescribed species have been found among the material available, much of which I owe to the continued generosity of Professor Thaxter :—

Torrubiella tenuis Petch, n. sp. Stroma pulvinate, or almost plane, up to 1·5 mm. diameter, white, tomentose, rather loose internally, sometimes surrounded by a broad, white, fibrillose margin or hypothallus.

Perithecia usually produced on the thicker part of the stroma, sometimes on the margin or hypothallus, sometimes occurring singly on scales which do not bear any stroma, except a slight weft of hyphæ at the base of the perithecium : scattered or clustered, elongated flask-shaped or elongated conoid, 0·65–0·9 mm. high, 0·2–0·25 diameter below, pale amber to pale yellow-brown, pale yellow or yellow-brown by transmitted light, subtranslucent, clothed with hyphæ up to two-thirds their height, or almost glabrous ; asci long, cylindrical, capitate, eight-spored, 7 μ diameter ; spores filiform, as long as the ascus, septate, dividing into cylindrical part-spores, 3–6 × 1 μ.

Ceylon ; on *Aspidiotus destructor* on a jungle tree, Pundaluoya, coll. E. E. Green, 1899 (Parkin, type 2, p. 19) ; on a black Aleyrodid on *Sarcococca pruniformis* Lindl., Hakgala, May, 1912 ; on a scale on *Hedyotis Lessertiana* Arn., Hakgala, January, 1914 ; on *Aleyrodes* on *Lasianthus Walkerianus* Wight and *Psychotria elongata* Hk. f., Hakgala, January, 1914.

Annals of the Royal Botanic Gardens, Peradeniya, Vol. VII., Part IV., June, 1922.

This is the species which Parkin compared to *Torrubiella tomentosa* Pat. An examination of perithecia of the latter species, kindly furnished by Professor Patouillard, shows that it is distinct.

Torrubiella sublintea Petch, n. sp. Stroma circular, up to 3 mm. diameter, compact, pulvinate in the centre, with a broad margin, white, margin somewhat floccose, centre acquiring a matted surface which becomes a more or less glabrous wrinkled sheet.

Perithecia situated round the thickened centre, singly, or more usually in groups, tomentose up to two-thirds their height, or clothed with mycelium which forms a common covering to two or three perithecia and acquires a glabrous external layer, elongated conoid, slightly attenuated above, 0·75 mm. high, 0·33 mm. diameter below, brownish-yellow, darker brown at the apex, subtranslucent, by transmitted light pale yellow to brownish-yellow, slightly brown towards the apex ; asci long, cylindrical, capitate, eight-spored, 6–8 μ diameter ; spores filiform, as long as the ascus, septate, dividing into cylindrical part-spores, 3–6 × 1·25 μ.

Conidia on the stroma or on the perithecia, arising laterally from regular simple hyphæ, either fusoid, three-septate, ends acute, but not produced, 18–24 × 4 μ, or five-septate, ends strongly attenuated and slightly curved, 36–46 × 3–4 μ, or seven-septate, falcate, ends equally curved and attenuated, 48 × 4 μ.

Chili ; on an Aleyrodid on an undetermined leaf, Corral, December, 1905, coll. et comm. R. Thaxter.

Torrubiella barda Petch, n. sp. Stroma up to 3 mm. diameter, compact, pulvinate, lacunose, sometimes with a broad thin hypothallus, orange-yellow, egg-yellow, or becoming whitish, more or less tomentose, but with the surface layer matted and tending to become membranous and glabrous.

Perithecia round the base of the pulvinate part of the stroma, solitary or clustered, usually surrounded by a weft of hyphæ of the same colour as the stroma, so that only the

ostiola project. Isolated perithecia conoid, yellow, with an outer coat of interwoven yellow hyphæ, 0·1 mm. thick, extending nearly to the apex which is red-brown and conoid; after removal of the tomentose coat, the perithecia are conoid, 0·75 mm. high, 0·35 mm. diameter, suddenly expanding above into a thickened capitate apex; wall of perithecium thick; by transmitted light the wall of the perithecium is yellow and the thickened apex orange or reddish-yellow. Asci long, cylindrical, capitate, eight-spored, 6–7 μ diameter; part-spores cylindric, becoming somewhat narrow-oval with obtuse ends, 4–7 × 1·5 μ.

Chili; on an Aleyrodid on an undetermined leaf, Corral, December, 1905, coll. et comm. R. Thaxter.

With regard to the previously-described species of *Torrubiella*, *T. brunnea* v. Keissler, as far as can be determined from the description, is most probably identical with *T. luteorostrata* Zimm. *T. tomentosa* Pat., originally recorded on an undetermined insect, which it was suggested might be a spider, is, Professor Patouillard informs me, on a scale insect.

The species of *Torrubiella* at present known to be parasitic on scale insects are :—

T. rubra Pat. & Lagh., Ecuador; Chili.

T. luteorostrata Zimm., Java; Ceylon; Seychelles; Upolu.

T. tenuis Petch, Ceylon.

T. sublintea Petch, Chili.

T. tomentosa Pat., Ecuador.

T. barda Petch, Chili.

T. Lecanii Johnst., Cuba.

Among a collection of scale insect fungi from Chili kindly submitted to me by Professor Thaxter is an *Aschersonia*, which does not agree with any of the species hitherto described. It may be known as *Aschersonia intermedia*.

Aschersonia intermedia Petch, n. sp. Stromata discoid, contracted at the base, up to 1·4 diameter, 0·4 mm. high,

sometimes horseshoe shaped, usually umbilicate in the centre, waxy-looking, minutely pruinose, pale yellow-brown or dark amber, surrounded by a paler fibrillose hypothallus, 0·1–0·2 mm. wide; ostiola inconspicuous, circularly arranged, radially elongated, irregularly oval, up to 0·15 × 0·1 mm., or sometimes labyrinthiform, pale yellow with a darker edge; pycnidia radially elongated, in transverse section oval at first, then opening widely, slightly convoluted at the base, up to 160 μ deep; pycnospores broadly fusoid and sometimes inequilateral, or subcylindric, 5–7 × 1·5 μ; paraphyses linear, 60–160 μ long.

On an Aleyrodid on an undetermined leaf, Corral, Chili, December, 1905, coll. R. Thaxter.

At first sight this appears to belong to the discoid group, resembling in shape *A. viridans* or *A. samœnsis*. Its pycnidia, however, are not regularly globose as in those species, but approach the widely-open convoluted pycnidia of *A. Aleyrodis*, *A. placenta*, &c. It falls into the same group as *A. Tamurai* and *A. taitensis*.

Specimens of *Aschersonia brunnea*, collected by Mr. A. T. Speare on *Ilex Cassine*, Winter Park, Florida, July, 1920, extend the known range of that species, and furnish additional information concerning its colour. It was described and figured as dark purple-brown from the only specimens known, viz., those in Herb. Kew collected in Brazil by Spruce. These recent specimens are yellow-brown, sometimes with a green tinge, more nearly resembling *Aschersonia badia*. It is possible that the darker colour of the old herbarium specimens may be due to the action of some preservative. The paraphyses of these Florida specimens are up to 200 μ long.

From the same locality and on the same host plant, Mr. Speare has forwarded specimens of *Aschersonia basicystis*, the flattened-pulvinate, white form with scattered pycnidia. The extruded spores on these examples form isolated heaps, often cylindrical, up to 0·25 mm. high. The spores measure 14–17 × 2–2·5 μ, and are oval with tapering ends.

Professor Thaxter's collection from Chili includes two examples of *Sphærostilbe flammea* Tul., from Concepcion, November, 1905, and from Corral, December, 1905, respectively. In the height of the conidial stage, these match *Microcera pluriseptata* Cke. & Massee. The ascospores measure 15–22 × 6–8 μ, and, in general, are more strongly verrucose than in any other examples seen.

When the account of the *Nectriæ* parasitic on scale insects was published, no examples of *Lisea Parlatoriæ* Zimm. had been seen by the writer. This species recently occurred (September-December, 1921) in fair quantity on a species of *Chionaspis* on *Gardenia florida* L. in the Royal Botanic Gardens, Peradeniya. The perithecia are densely clustered on a thin, byssoid, purple-brown stroma, which is sometimes whitish at the margin ; they are subconoid, up to 0·25 mm. high, 0·3 mm. diameter, obtuse at the apex, ostiolum not elevated, purple-brown becoming almost black, rough with large, close-set warts composed of cells up to 16 μ diameter. The perithecial wall is thick, violet by transmitted light, of large cells, with a few, stout, violet hyphæ, 4 μ diameter, at the base. The developing perithecia have hyphæ in the form of branched moniliform chains at their base. The asci are cylindrico-clavate, scarcely pedicellate, eight-spored, with spores obliquely uniseriate or irregularly arranged, 80 × 8 μ ; no paraphyses. The ascospores are oval or narrow-oval, hyaline, one-septate, not constricted, rounded at the ends, 9–13 × 4–6 μ.

The conidial stage forms white tufts at the margin of the scale. These are loosely built, and consist of rather rigid, branching, hyaline conidiophores, up to 0·4 mm. high, 4 μ diameter, fasciculate below, diverging, repeatedly branched, the ultimate branches solitary, often unilateral, or in whorls of two or three, attenuated outwards, one-septate. The tufts show a purple tinge at the base. The conidia are narrow-cymbiform or fusoid, usually straight, sometimes slightly curved, three-septate, 18–40 × 3–5 μ, or four- to five-septate, slightly falcate at one end, 46–64 × 3–4 μ. When old or weathered, the conidiophores collapse into a confused tangle which becomes purple.

NOTES.

The Bird Chilli.—The common Nayi-miris (*Capsicum minimum* Roxb.) is known as the Bird Chilli. On January 20, 1918, I observed three or four crows (*Corone macrorhyncha*) round some low bushes of this plant, busily engaged in devouring the green, unripe fruits. They seized the fruit with their beaks, and with a vigorous tug broke it off just above the level of the calyx.—T.P.

Desmodium tortuosum DC.—This species occurs as an occasional weed in the neighbourhood of Kandy, and is not uncommon in flower beds in the Royal Botanic Gardens, Peradeniya. There is a specimen in the Peradeniya Herbarium labelled "*Desmodium* sp., R. Bot. Garden, 1860," by Thwaites, and another, similarly labelled by Thwaites, with the addition in the same handwriting, "from Mauritius, H. de Alwis." This additional note would seem to indicate that the supposed origin of the plant was a gardens' tradition, which was not supported by any documentary evidence. The plant is not mentioned by Trimen in the Flora of Ceylon, nor in his Hortus Zeylanicus.

Specimens of the form which occurs as a weed have been identified at Kew. The plant was introduced *viâ* the United States Department of Agriculture in 1896 as a fodder plant, and in 1897 was said to have grown fairly well in all the Gardens. But it was not taken up by the public generally, and there is no specimen in the herbarium to show what form was then introduced.

In the Ceylon weed the flowers in bud are green with purple wings and become purple on expansion. About mid-day they "explode," and the exploded flower becomes pale blue.—T.P.

Weeds.—*Apium Ammi* (Jacq.) Urb. occurred as a weed on waste ground at Haputale in November, 1917. *Cordia Aubletii* A. DC. is now a weed round the hotel at Anuradhapura ; it was introduced into Ceylon from British Guiana in

1888, and was probably transferred from Peradeniya with other plants to the old Experimental Garden at Anuradhapura, which is now the hotel grounds. *Plantago pumila* Willd. appeared in abundance in beds of Cummin grown from imported Indian seed on the Experiment Station, Gangaruwa, in 1917. *Senebiera didyma* Pers. was common as a roadside weed along the Ramboda road, Nuwara Eliya, in September, 1918, particularly round stone heaps ; there is a specimen in the Peradeniya Herbarium from the Herbaceous Garden, Peradeniya, 1894.—T.P.

Ceylon Syrup of Squills.—In Grimm's Laboratorium Ceylonicum, that author included *Scilla* among the Ceylon medicinal plants, and stated " Componuntur ex ea Acetum and Oximel Scilliticum." The probable explanation of this reference is to be found in Thunberg's Travels, Vol. 4, p. 150 (English edition), where the latter author, in writing of Samarang, states : " The *Crinum latifolium*, which may be used instead of the *Scilla* or Squills, grows here, near Batavia, and in other parts."—T.P.

Vernacular Names for Plants.—Mr. C. Drieberg informs me that the Shoe-flower (*Hibiscus rosa-sinensis* L.) is known as Wada in the Southern Province (Matara District). That name was recorded, in the form Waddaghas, by Hermann (Musæum Zeylanicum, pp. 29, 61). The name by which it is usually known is Sapathu mal, which is evidently derived from the Portuguese Fulo de Sapatta, also recorded by Hermann, who stated that it obtained that name from the fact that the juice of the flowers was used for blacking shoes (*quod succo florum coria tinguntur.*)

Mr. Drieberg also found that at Tissa the Lettuce Tree (*Pisonia alba*) was known as Ketta, and points out that the latter name is, perhaps, a corruption of the Tamil Lechchai Kedda.

Tephrosia Hookeriana W. & A. has been sent in from the Galle District under the name of Ela-pila. Pila is a generic name for *Tephrosia*, but the name Ela-pila was not recorded by Moon, Thwaites, or Trimen.

"Alavanga pillu" has been identified at Kew as *Erigeron sumatrensis* Retz. It no doubt obtains its local name from its erect, simple stem. The first specimen placed in the Peradeniya Herbarium was collected in November, 1898.

The weed which has achieved notoriety as the Kurunegala Daisy is *Tridax procumbens* L.

Specimens of *Tabærnæmontana coronaria* Br. have been received from the Southern Province under the name Wata Suda. This confirms the Sinhalese name given for this species by Moon.

The common paddy field weed, *Fimbristylis miliacea* Vahl, has been sent in from the Southern Province as Kudu Matta. This name had not been recorded previously. The Sinhalese name which has previously been known for this plant is Mudu-halpan.

Acanthospermum humile DC. was first recorded for Ceylon from the Colombo District in 1916. Mr. F. Lewis has recently (August, 1921), collected it in the Puttalam District, where it is known as Katu-nerenchi, from its resemblance to *Tribulus terrestris*.—T.P.

The Water Hyacinth (*Eichhornia crassipes*).—The native names which have been given to this plant in Ceylon are of interest from several view points.

In the Tangalla District it was known in 1914 as Japan Yabara, apparently under the impression that it came from Japan. That was not very wide of the mark, the plant having been introduced from Hong Kong. Yabara is possibly the same as Yapura, recorded by Clough (p. 379) as a medicinal plant not identified. Hermann (Mus. Zeyl., p. 24), recorded Sabara for a plant which Linnæus identified as *Monochoria hastæfolia*, Diya-habarala, and Yapara appears in a list of Ceylon medicinal seeds sent to Leyden in 1785. It would appear that Yabara, Yapura, Sabara are variants of the Habara in Diya-habarala.

In the Kadugannawa District the Water Hyacinth was known in 1916 as Diya-kehel, *i.e.*, the water plantain. The name may have been suggested by the inflated leaf bases.

The only previous record of the name was made by Moon, and he included it in his list of varieties of the plantain, but it is most probable that he was guessing from the name, and had not seen a specimen. This name does not appear to be in use at the present day, but one may hazard the suggestion that it probably referred originally to *Jussiæa repens*, whose spongy floats resemble peeled plantains.

In 1917 the name Diya-manel was supplied for the Water Hyacinth in the Eadella District. The idea underlying this name is fairly obvious. Manel is the Water Lily, *Nymphæa stellata* Willd. Goda-manel is *Crinum asiaticum* L., or the Lily which grows on land (goda = land). Diya-manel (Diya = water) is consequently a water lily, though in this case the Diya would seem to be tautological. But it is of interest to note that the same name was given to Thwaites in a neighbouring district for a plant which proved to be an introduced species, *Hymenocallis tenuiflora* Herb.

In the Kandy District there is a belief that the Water Hyacinth is a native medicinal plant, known as Diya-beraliya, and the idea is as difficult to eradicate as the plant itself. The name Diya-beraliya was not met with by Thwaites or Trimen, but it was recorded by Hermann, whose specimens were *Monochoria hastæfolia* Presl., *i.e.*, Diya-habarala. The name does not appear to have been used with any definiteness at any time, and specimens of Diya-beraliya sent in recently from the Southern Province proved to be a *Commelina*. The basis of reasoning on which this name is applied to a water plant is not evident. Beraliya is *Doona cordifolia* Thw., and has been applied to *Doona oblonga* Thw. Pini-beraliya is *Doona ovalifolia* Thw. Kotikan-beraliya is *Doona nervosa* Thw. Honda-beraliya is *Doona macrophylla* Thw. Rat-beraliya is *Hopea jucunda* Thw. Thus, these other species of "Beraliya" are Dipterocarps, and it is difficult to see any resemblance between them and *Monochoria*.

The Water Hyacinth seeds freely in Ceylon, and it is proving difficult to eradicate where it has been allowed to flower, because of the delayed germination of the seeds.

On May 30, 1916, seeds from the same capsule were divided into two lots, one of which was placed in water and the other on mud in glass dishes exposed to the light in the Laboratory at Peradeniya, in a room in which the temperature varies from 71 to 81° F. The seeds sink in water. On September 2, 1916, half of those in water were transferred to a similar dish of water, which was subsequently kept in darkness. A thick film of algæ developed over the surface of the mud, and the seeds in that dish were lost sight of. This set was discarded in December, 1918, by which time none of the seeds had germinated.

A thin tough film of algæ similarly grew over the bottom of the dish which contained the seeds exposed to light, and covered the seeds. This film was removed periodically. No alga film developed in the dish kept in the dark.

In December, 1918, the dish exposed to light was accidentally moved to a position in which direct sunlight fell on it in the early morning, and the seeds were left dry for one or two days. Water was again added, and in the course of a week the seeds germinated (December 30, 1918). Half of the seeds kept in water in darkness were then dried off, and after two days were again immersed in water. None of these seeds, however, have germinated up to date (March 4, 1920).

The Water Hyacinth was introduced into Ceylon as an ornamental plant. In that respect, however, though undoubtedly handsome, it has the defect that the inflorescence is of short duration. On the second morning, the stalk bends over and either the whole or part of the flowers are plunged beneath the surface of the water. This usually occurs, at Peradeniya, by 8.30 A.M.

In addition to the recorded methods of propagation, viz., by seeds and by offsetts, a third has been observed at Peradeniya. When a plant is old and the lower part is a mass of decayed leaf-bases, the terminal bud develops rootlets, separates from the plant, and floats off to begin an independent existence.—T.P.

H. R. COTTLE, GOVERNMENT PRINTER, COLOMBO, CEYLON.

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